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ARCHEOLOGICAL REMAINS IN THE WHITEWATER DISTRICT EASTERN ARIZONA

PART II. ARTIFACTS AND BURIALS

By FRANK H. H. ROBERTS, JR.

WITH APPENDIX

SKELETAL REMAINS FROM THE WHITEWATER DISTRICT, EASTERN ARIZONA

By T. D. STEWART

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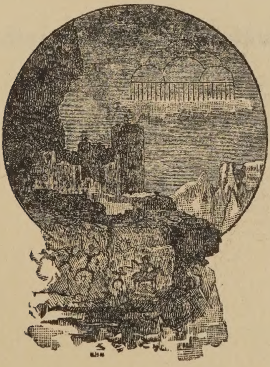

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LETTER OF TRANSMITTAL

Smithsonian Institution,
Bureau of American Ethnology,
Washington, D. C., June 10, 1939.

Sir: I have the honor to submit the accompanying manuscript, entitled "Archeological Remains in the Whitewater District, Eastern Arizona, Part II. Artifacts and Burials," by Frank H. H. Roberts, Jr., with an appendix entitled "Skeletal Remains From the Whitewater District, Eastern Arizona," by T. D. Stewart, and to recommend that it be published as a bulletin of the Bureau of American Ethnology.

Very respectfully yours,

M. W. Stirling, *Chief.*

Dr. C. G. Abbot,
Secretary of the Smithsonian Institution.

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FOREWORD

The nature, location, and general cultural status of the archeological remains in the Whitewater District in eastern Arizona, with specific information on the house and village types, was presented in Part I (Bur. Amer. Ethnol. Bull. 121) of this report. Further consideration of those features is not essential to the discussion of the lesser phases of the material culture appearing in the following pages and will not be repeated here. Readers desiring additional data on characteristics of the stages of the Anasazi or Basket Maker-Pueblo pattern indicated by the collections described in this volume may refer to the proper sections in Part I.

Discussion of the ceramic types and variations in the several forms of pottery is based for the most part on an archeological approach to the subject rather than on any of the methods of laboratory examination and analysis that have been developed in recent years. Most of the work was done before those systems of testing attained their present state of elaboration and intricacy. While the results unquestionably fail to furnish much of the minutiae deemed indispensable by the ceramic technicians, they nevertheless shed some light on stylistic trends and changes in the local industry and give evidence of an interplay of influences spreading from several centers of development. Names for some of the types and subtypes occurring in the Whitewater District had not yet been formulated when this report was prepared and as a consequence do not appear in the text. Where it is possible to correlate some of the Whitewater forms with those described and named in some of the recent publications, the relationship is indicated in footnotes. There undoubtedly are others that do belong to sundry categories now identified with a specific designation, but the lack of accompanying illustrations in the descriptions of numerous forms makes recognition uncertain and for that reason mention of the names is omitted.

The collection of specimens was distributed after the completion of the work. Some went to J. A. Grubbs of Houck, Ariz., some to the Laboratory of Anthropology at Santa Fe, N. Mex., and the remainder to the United States National Museum at Washington. The disposition of the articles illustrated in the plates and text figures is indicated in the tables in the appendix.

ARCHEOLOGICAL REMAINS IN THE WHITEWATER DISTRICT, EASTERN ARIZONA

Part II. Artifacts and Burials

By Frank H. H. Roberts, Jr.

INTRODUCTION

The artifacts recovered during the digging in the several sites investigated in the Whitewater District consist of pottery, additional objects of fired clay, bone and stone implements, minor articles fashioned from those materials, and shell worked into objects for personal adornment. These specimens are all of durable materials and represent but one phase of the arts and industries of the people. That part of the material culture composed of things made from perishable substances is practically missing. A few potsherds bearing basketry impressions and several pieces of charred cord found in one of the structures that had been destroyed by fire are all that survived to indicate the existence of this group. The imprints made in the damp clay of vessels and fixed by the firing process show that the basketry was of the characteristically coiled Anasazi form. The cord is of two types. One was made from cotton, the other from apocynum fiber. Because of the charring and small size of the fragments, identification of species is not possible. Neither can their use be determined. From materials obtained in the excavation of dry caves, however, it is known that both apocynum and cotton were employed in the making of various articles. There is no evidence on the kinds of clothing, textiles, or wooden implements that unquestionably played a prominent part in the daily life of the occupants of the district. Hence the collection does not accurately portray the handiwork of the period. It gives only a one-sided picture and in considering the degree of development indicated by the specimens this fact should be borne in mind. Actually what remains is only a minor proportion of the total and there is much, unfortunately, that can never be known about the arts and industries.

The specimens in the collection were found in the remains of houses, in the various refuse mounds, as offerings accompanying burials, and, in a few cases, were lying on the old surface of occupation near dwellings and outside fire pits. There is no discernible difference between those found in graves and those from other locations. Consequently it is apparent that no articles were made especially for funerary purposes. Those interred with the deceased were either personal belongings or part of the ordinary household equipment contributed as a final offering.

Although most of the artifacts represent one stage, the Developmental Pueblo, there are a few from two others in the Anasazi pattern, Modified Basket Maker and Great Pueblo.[1] In order to make clear the period differences and facilitate discussion, the various objects comprised in each of the several groups will be considered together. Thus all of the pottery will be included in a single section, such characteristics and variations as have a bearing on the stage represented being indicated in the descriptions of the forms. The other specimens will be treated in a similar manner, although there are not as many period differences to be noted as in the case of the ceramic group.

Inhumation was the prevailing method for disposing of the dead. No traces of cremation appeared in any of the digging. That practice apparently had not been introduced into this district at that time, even though it was in use in regions farther south and west. Most of the burials were in the refuse mounds accompanying the house clusters. A few had been made in rooms in some of the dwellings, some were in or beneath the pit portions of granaries, and others were in shallow pits scraped out of the natural surface of the earth. Several body positions were noted in the series as a whole, but most of them were some variant of the general contracted form found throughout most of the Anasazi province. An interesting and puzzling feature was the small number of graves attributable to the Great Pueblo stage of occupancy. While no excavations were carried on in the ruins of that period, sufficient work was done in the refuse mounds and area adjacent to the buildings to reveal any series of burials possibly present there, yet less than a half dozen were located. Furthermore, run-off waters, following heavy rains and from melting snows, cut channels through one of the dump heaps associated with the main ruins and exposed large areas of the deposits without revealing evidences of interments. Hence it seems that the dead were either transported some distance from the village before being buried or else were disposed of by some other method. This lack of human remains for the Great Pueblo horizon corresponds to a similar condition in the Chaco Canyon in northwestern New Mexico and at other sites where the cultural pattern shows definite relationship to the Chaco center.[2] As previously mentioned, in discussing the possible affinities of the Whitewater group, there was a strong Chaco influence in this district and the absence of Great Pueblo period graves is likely due to that factor. Most of the bones were in a poor state of preservation and as a consequence only a small series of remains is available for study. They indicate a number of interesting things, however, and Dr. T. D. Stewart, assistant curator of physical anthropology, United States National Museum, points out their significance in his notes on the skeletal material.

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[1] See Part I (Bur. Amer. Ethnol. Bull. 121), p. 253.

THE ARTIFACTS

POTTERY

True pottery first appeared in the Anasazi province in the Modified Basket Maker stage of development, in fact it is one of the traits that help to differentiate the period from the preceding Basket Maker.[3] At about the end of the latter horizon, possibly in the transition from it to the Modified Basket Maker, vessels were occasionally made from unfired clay that had been tempered with shredded cedar bark or grass. These were the prototypes for the later wares that came to play so prominent a part in the industry of the people. A combination of methods was used in the manufacture of the mud vessels. In some cases the bottoms were molded in baskets, the walls or rims rising above the mold being formed of fillets of clay that were looped around the upper edges. Each strip made a single circuit of the perimeter and was welded or pressed to the one below while the clay was still moist. Others indicate that they were fashioned entirely by hand without the aid of a basal support, the bands of clay being employed throughout in this early form of the coiling process. Principal shapes were large, shallow trays and deep bowls. Additional articles of unfired clay also appeared at about the same time. They consisted of crude figurines of human females, models of bifurcated baskets of the type made by the Basket Makers, and small nipple-shaped objects that may be representations of carrying baskets to be attached to the backs of figurines but whose actual purpose is unknown.[4] These also were prototypes for more elaborate forms in subsequent stages and with the development of true ceramics they too were fired.

The complex of unfired clay objects may be attributed to influences reaching the province from regions to the South. Indications are that the manufacture of these articles resulted from an impulse of ideas rather than from a copying of actual objects carried into the area. There is good evidence to support the belief that the methods used in making the objects were mainly indigenous and that the entire subsequent development of the industry grew out of local experimentation and effort. The Basket Makers were adept in the working of clay because they made extensive use of it in all forms of architectural construction, particularly in their granaries, and it would be a relatively simple matter to transfer the technique to the fashioning of clay vessels. This is quite evident when it is remembered that the juglike necks at the top of many of the granaries were built up of large rings of clay strengthened with grass and cedar bark, each successive ring having a shorter diameter than the one below so that the walls were drawn in toward the opening. Furthermore, the small shelflike handles on the outside of the bowls are miniature reproductions of the mud steps placed on granary walls and the sloping stone floors in caves.[5] The walls of the granaries were smoothed and in many cases the evidence for the rings almost obliterated. The same was true for the vessels. Hence it seems that the close similarity between the various steps in the making of granary tops and mud bowls is attributable to more than mere coincidence.

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[2] Part I, pp. 251–252.

[3] Part I, pp. 8–9.

[4] Guernsey, 1931, pp. 84–88; Guernsey and Kidder, 1921, p. 98; Morris, 1927, pp. 138–160; and Nusbaum, 1922, pp. 138–144.

When the firing of vessels developed, it became necessary to replace the bark binder in the clay with some noncombustible substance in order to avoid holes and cavities in the walls where the vegetal matter burned out. Thus the custom of mixing sand with the clay was introduced and true pottery, in which the constituent paste had been tempered with sand, appeared. As the industry progressed there was a marked reduction in the amount of sand used, the potters apparently discovering that a smaller proportion and a better kneading of the clay produced a harder and more compact texture. Sand was gradually replaced by ground or powdered rock, the kind varying in accordance with the available material in the district where the potter lived, but generally it was either of the light-colored quartz or quartzite group or a dark igneous stone. Wares of this type were standard for the Modified Basket Maker period.

Modified Basket Maker pottery occurs in a variety of shapes. There are full-bodied jars with restricted necks and small openings, full-bodied jars of an elongated spherical shape with very short neck and large orifice, globular or spherical pots with slightly depressed top and wide orifice, globular vessels with a small opening, bowls, pitchers, scoops and ladles, and small pots with lateral spouts. There are three main groups of vessels. The largest consists of those with a light gray to fairly good white color and includes all of the different shapes. A much smaller series is that of bowls with a dull black interior and a gray exterior. The third class is an extremely minor one comprising pitchers and bowls of a reddish cast that seems to have been produced by overfiring. Whether this was intentional or the result of secondary firing in the burning of houses is not known, but occasional specimens exhibiting the feature occur at most sites. The vessels were made from the same materials and in the same manner as the light gray to white examples, no wash that would produce a red color under proper firing conditions being applied to the surface. The finish on most vessels was somewhat rough because of protruding particles of the sand or crushed rock used in the tempering process. For this reason the pottery has a characteristic, irregularly stippled appearance. Decoration, for the most part, was confined to the interior of bowls, although there are sporadic examples with a design on the outside of a bowl, in a ladle or on a pitcher. Two kinds of pigment, one a carbon and the other an iron, were used in applying the ornamentation. The carbon type prevailed in northeastern Arizona, while the iron form, in later stages an iron-carbon, was widely distributed over the remainder of the area. The designs are generally ribbon-like panels embellished with dots, zigzag and stepped-line elements, occasionally with wide-spaced squiggled hachure lines, and less frequently with zoomorphic or anthropomorphic figures. Most of the decorations were carried over from basketry to pottery and the earliest designs are close copies of those which already were familiar to the people. Many vessels during this period were treated, after firing, with a wash of red pigment. This is impermanent and is known as "fugitive red."

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[5] Morris, 1927, pp. 159–160.

The opening of the Developmental Pueblo period witnessed some changes in the pottery. As the period progressed new features were introduced and there was a marked expansion in the industry. The various potters continued to use white sand or pulverized rock in tempering their clay, but in addition they began to add ground potsherds to the mixture. As more of this material became available through the continued breaking of dishes in the regular course of usage, it formed a larger percentage of the mixture and there was a noticeable drop in the amount of sand and rock particles. Surfaces received more careful smoothing and the application of a slip was introduced. This was a thin coating of "liquid" clay rubbed over the smoothed vessel to give it an even better surface. One group of vessels, those intended for culinary purposes, took on a feature that is diagnostic of the period. The outer surface around the necks was not rubbed and the bands of clay from which they were fashioned were left as a decorative element. At first these bands were broad and each one made only a single circuit of the vessel wall. As the stage advanced the fillets were rolled smaller and were long enough to circle the perimeter several times and true coiling resulted. This was followed by indentation of the coils by pinching with the finger, by the working in of simple designs through indentation, and the incising of figures with a tool or finger nail. Sometimes the bands or coils were rubbed and then reemphasized by the use of a tool. In all of these forms the bottom, from the shoulder down, was carefully smoothed.

Developmental Pueblo pottery has a great diversity of forms. There are large full-bodied jars with long tapering necks and restricted orifices; full-bodied jars with short, squat necks and constricted orifices; globular-bodied jars with short necks and wide orifices; full-bodied vessels with an elongated spherical or ovoid shape with squat neck and wide orifice; spherical or globular pots with a small, round opening at the top and similar-shaped vessels with a short-cylindrical neck and small orifice, the type called canteens; globular pots with a flattened top and medium-sized circular orifice, the so-called seed-jar shape; pitchers of many varieties, including the bird-shaped forms; cylindrical jars; double-lobed jars; bowls; ladles and scoops; eccentric forms; and effigy vessels.

The colors are plain gray, black on white, black on red, and there are bowls with a brownish exterior and slightly burnished interior. As the period advanced the latter became a good red with a highly burnished black. All types of vessels were decorated. In the earlier stages the main design elements were zigzag, parallel and parallel-stepped lines, squiggled lines; solid triangles and dotted triangles; volutes and ticked volutes; interlocking frets; running frets; concentric rectilinear and curvilinear figures; and checkerboard patterns. In addition to the decorations taken from baskets are those copied from head bands, sandals, and textiles. Later in the period the potters began to drop the series of bordering lines from the designs and used more broad, heavy elements.

The black-on-white pottery, that is, light-colored vessels ornamented with painted designs in black, of the Developmental period was characterized by two main groups. This was more pronounced in the earlier part of the horizon than in the later stages, but forms derived from both persisted throughout all phases and even continued into the subsequent Great Pueblo. There were many local, minor variations, of course, yet all seem to have been related to one or the other of the two main groups. One of these occurred throughout the eastern part of the Anasazi province and the other predominated in the western precincts. The eastern form centered about the Chaco

Canyon area and apparently diffused from that locality. The western developed and spread from the Kayenta district in northeastern Arizona. The eastern type had a wider distribution, covering the area from the San Juan basin in southern Colorado to the Upper Gila region in southern New Mexico and from the Rio Grande on the east to approximately the Arizona-New Mexico boundary on the west. Its southern fringes extended into Arizona along the Puerco River and as far south as the juncture of the Zuñi and Little Colorado Rivers. The western ranged from northeastern Arizona to the Little Colorado in the eastern part of the state, crossed that stream somewhat farther west and faded out in southeastern Nevada. The eastern boundary is not sharply defined and there is a strip along the Arizona-New Mexico line where the two overlap. Both forms represent what is generally known as Pueblo I pottery. The western was recognized first and for a long time was considered typical for the period. It has been called by a number of names. Slab-house was the first,[6] and this was followed by Pre-Pueblo,[7] Kayenta Pre-Pueblo,[8] Western Pueblo I,[9] First Tusayan,[10] and the present designation of Kana-a black on white.[11] The eastern was not identified as a Pueblo I ware until much later.[12] It has been known by a number of different names. "Quien Sabe" was commonly used until its status was determined, then Chaco Canyon Pre-Pueblo, Chaco I,[13] Eastern Pueblo I,[14] and Kiatuthlanna black on white.[15] No one designation has been adopted as the preferred form, although Chaco I is probably more widely used than all the others combined. The difference between the forms is twofold, the surface appearance and the type of pigment employed in the decorations. A carbon paint was applied to the western or Kana-a vessels, while an iron mixture was used on the eastern or Chaco-style wares. The decoration on the Kana-a black on white seems to penetrate into the slip, an appearance like that made by ink lines on unsurfaced paper, while the Chaco designs stand out from their background (pl. 1). Although such is not actually the case, the Kana-a vessels look as though the surface polish was applied over the ornamentation. The difference in pigment was a continuation of the practice noted for Modified Basket Maker wares.

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[6] Kidder and Guernsey, 1919, pp. 152–153.
[7] Kidder, 1924, pp. 74–76; and Morris, 1919, p. 204.
[8] Roberts, 1931 a, p. 10.
[9] Roberts, 1931 b, p. 165.
[10] Gladwin, 1930 a, p. 181.
[11] Hargrave, 1932, p. 15.
[12] Roberts, 1931 a, p. 10; Roberts, 1931 b, p. 165.
[13] Mera, 1935, p. 3, pl. 1.
[14] Roberts, 1931 b, p. 165.
[15] Gladwin, 1934, fig. 3, fig. 4.

In combining the Pueblo I and Pueblo II periods of the Pecos Classification to make the Developmental Pueblo of the system used in this report,[16] a number of pottery forms hitherto considered as distinct from the Pueblo I wares are grouped with them in a sequential series. There is a noticeable difference between early and late Developmental vessels as will become apparent in the detailed discussion of many of the specimens from the Whitewater District. but in most cases the derivation of the later from the earlier types is so evident that there is no need for confusion. The stages in the growth of the cultural pattern as outlined by the Pecos Classification were identified in large degree by the pottery types and there is sufficient variation between early and late Developmental wares to warrant a distinction. There are forms intermediate between the two, however, that could not be assigned to either and the problem of where to place them was troublesome. They were usually referred to as transitional and some confusion was caused by the fact that one field worker would consider them Pueblo I while another would list them as Pueblo II. Under the new classification they take their proper position as middle Developmental forms.

The pottery of the Great Pueblo period retained many of the features of the closing stages of the Developmental. There were the gray wares of the culinary group, the black on white, black on red, burnished black interior with red exterior, and in addition new types consisting of polychrome, black-on-yellow, and black-on-orange vessels. The texture for the most part was finer than that for the previous stage and there was an even greater use of powdered potsherds for tempering the clay. A characteristic feature in the gray wares, the culinary vessels, is an allover indented corrugation of the coils. There was not as great a variety of vessel shapes as in the Developmental group, but the potters continued to make wide-mouthed, globular-bodied jars; globular-bodied jars with slightly depressed tops and short cylindrical necks with small orifices; small globular-bodied vessels with short necks and small openings, the so-called canteens; rounded-bottom jars with flat top and medium-sized orifice, the seed-jar form; pitchers; bowls; and ladles. Decorations were characterized by elaborate detail and careful execution and heavy, solid elements were widely used. This was an era of marked specialization and the crystalization of previous trends into patterns typical of various centers so that it is possible to tell at a glance whether the maker of a vessel was influenced by Chaco Canyon, Mesa Verde, Mimbres, Kayenta, or Little Colorado styles.[17]

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[16] See Part I, pp. 6–7.

[17] For more details on ceramics of this period see: Cosgrove, 1932; Hargrave, 1932; Kidder, 1924; Pepper, 1920; and Roberts, 1932, for additional references.

During the Regressive and Renaissance periods there was a marked increase in the manufacture of various kinds of colored wares and a dropping off and final abandonment of the black on white. This characteristic prevailed in the modern period as well. Since none of the types made subsequent to the beginning stages of the Great Pueblo horizon are present in the material from the Whitewater District further consideration of their features is not essential to this report and will be omitted.

The collection from the Whitewater sites contains a few examples of the Modified Basket Maker wares, a large number of Developmental Pueblo pieces, and some from the Great Pueblo horizon. Interesting data on the sequential relationship of various types was obtained from the stratigraphic tests made in some of the refuse mounds and from the pillars in the pit houses. As mentioned in the discussion of the excavations, a 3-foot square pillar was left near the center of the different house pits when the accumulated debris was removed from them, and these pillars were taken down, layer by layer, the potsherd material being segregated for study purposes. The evidence from 12 such pillars gives a clear picture of the order of appearance of different forms and the steps in the development of various styles of decoration. The proportions were not the same for all tests, as some of the houses were later than others and the pillars did not contain identical strata in all cases. The bottom levels in some were not present in others and the upper strata in the later pits yielded examples completely missing from the fill in the earlier ones. Furthermore, the bottom layers in some of the refuse mounds represented older materials than any from the fill in the houses. By correlating similar levels, however, a continuous sequence is obtained. Wherever a series of identical strata occurred in the pillars and refuse heap tests, the order of the forms was consistent. No attempt was made to work out a detailed statistical study of the potsherds because simple percentages are sufficient to show the main trends and progress in the ceramic industry. The results from different parts of the district check so closely and are in such accord with those from other portions of the Anasazi province where similar studies have been made that there can be little question of their correctness.

The wares from the Whitewater District consist of the plain gray, the so-called culinary or utility group, black on white, burnished black, and black on red. All of the larger vessels and most of the small ones were made by the coiling process; a few of the miniature forms seem to have been molded from lumps of clay rather than built up by the use of fillets rolled out from that material. None of them, however, can be considered as examples of the paddle and anvil method of finishing vessels nor did any of the larger forms suggest that technique, one of the characteristics of the Hohokam.[18] Wherever coils were obliterated, the typical Anasazi system of scraping with a tool and smoothing the surface, adding to the finish with a polishing stone on later forms, seems to have been employed.

Percentages for the different wares, based on all the potsherd material from the test sections and from the debris in the houses, show 64.1 for the gray or utility group, 32.7 for the black on white, 2.5 for the black interior with the dull and burnished forms combined, 0.2 for the black on red, and 0.5 for the undecorated nonutility class that was treated with the "fugitive red." The utility group breaks down into three subdivisions with 3.4 for the indented corrugated, 9.2 for the banded necks, and 51.5 for the plain gray. The latter comprises fragments from the sides and bottom of vessels that had been smoothed. While a majority of these sherds no doubt represent the banded-neck group, some unquestionably must have come from vessels that were completely smoothed and others from those with indented-corrugated necks and smoothed bodies. The general character of the paste, the mixture of clay and the material with which it was tempered, and surface finish are such that it is only possible to tell in rare cases which of the three forms the plain pieces represent. Hence the necessity for grouping them under the single heading of plain gray. In all probability a good 70 percent of the plain fragments are from the banded-neck class, with the other 30 percent divided about equally between the indented corrugated group and that composed of the vessels on which all traces of the coils had been obliterated. The preponderance of the banded-neck form in the present series is attributable to the fact that a large part of the excavation was done in structures and refuse mounds belonging to the period when that was the prevailing style. Further investigations would, no doubt, considerably increase the number of indented corrugated pieces, because that type, in which the entire surface of the vessels is so treated, was characteristic of the Great Pueblo stage and most of the work remaining to be done in the district is in ruins of that horizon. This probably would cause a proportionate drop in the percentages for the banded-neck and completely smooth groups. From a broad point of view the significant factor is the proportion of the utility or culinary group as a whole in relation to all of the wares.

That the percentages for the various forms in the Whitewater district are not far from a general pattern is shown by comparison with those from Pueblo Bonito, in the Chaco Canyon. The total for the culinary group at the latter place is 65.6 and is not greatly divergent from the 64.1 of the former. The black-on-white wares at Bonito were 30.3 percent of all the pottery, a fairly good approximation to the 32.7 percent in the Whitewater series. The burnished black were not as numerous in the Chaco and constituted only 1.4 percent of the total, in contrast to the 2.5 percent of the Arizona material. The black-on-red wares were just the reverse with 2.7 percent in the Bonito group and 0.2 percent in the Whitewater. There are plausible explanations for some of these differences. The burnished black is a form that had its greatest development in southern centers. There is some disagreement about its place of origin, with indications that it may have been a Little Colorado type or that it came from the Mogollon district,[19] and for that reason would have a greater influence on communities near at hand than on those farther removed. Because of its proximity to regions where the ware was popular, the Whitewater District would tend to be affected more than the Chaco. The case of the black-on-red wares is somewhat different. Although they were made from early times they did not attain much prominence in the Anasazi province until later stages and the Whitewater center was abandoned just as they were beginning to become more numerous. Pueblo Bonito and the Chaco Canyon, on the other hand, flourished for some years thereafter and not only had a fair representation of the black on red but even some of the earlier forms of the polychrome that was to become widely used in the following Pueblo stages. The same situation prevails in respect to the black-on-red vessels in the Whitewater District as that noted for the utility wares; namely, the lack of excavation in the Great period ruins probably lessened the number of specimens of that type. However, sherds from such vessels are noticeably rare in the refuse mounds belonging to that stage. This factor is particularly noteworthy because the Whitewater remains are in a region where both the black on red and the polychromes predominate in the fragments scattered about most of the sites. Age differences are unquestionably the reason for the variation in the ceramic forms. The larger the proportion of colored wares the later the site, seems to be a definite archeological tenet in this particular area.

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[18] See Part I, pp. 14–15.

Some of the more significant features emphasized by the material from the stratigraphic tests are those pertaining to the Modified Basket Maker wares, progress in the development of the culinary or gray wares, the sequence in which some of the early Developmental period black-on-white types made their appearance, and changes in the burnished-black group. The oldest deposits of those investigated were the bottom layers of the refuse mound located southeast from structures 1, 2, and 3, in Group 1. The lowest strata in tests No 1 and No 2 (see Part I, fig 1, p 22, for plan of group and mound and location of stratigraphic sections) were the only ones in all of the sections where Modified Basket Maker sherds occurred unassociated with other forms. Here they were at the very bottom of the strata on the contact line between the dump material and the undisturbed substratum. They either were lying on the surface when the first refuse was dumped there or were a part of it That the latter may have been the case is suggested by the fact that the upper portion of the bottom layer in both No 1 and No 2 contained a mixture of Modified Basket Maker and early Developmental Pueblo fragments. This would indicate that the refuse was deposited there during the transition from Modified Basket Maker to Developmental Pueblo. The fact that the Modified Basket Maker pieces found alone are representative of the highest development of that pottery and that the Developmental Pueblo pieces are examples of its simplest forms substantiates that conclusion. Other features associated with this portion of the site, particularly some of those mentioned in the discussion of the structural remains, also suggest a changing pattern. Later levels in these and other stratigraphic sections contained sporadic sherds from Modified Basket Maker vessels, but there is no significance in the occurrences because they merely illustrate the survival of objects in subsequent periods and their tendency to reappear under any and all circumstances. The important evidence is the isolated series underlying Developmental Pueblo types in undisturbed deposits. It demonstrates that here as elsewhere the Modified Basket Makers actually preceded the Pueblos, although they do not seem to have been more than well established before the latter arrived.

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[19] See Part I, pp. 15–16.

The gray or utility wares had completely smoothed exterior surfaces in the earliest form represented in the sequential series. This was followed by pots with banded necks, the bands being rather broad and flat. Eventually the bands became narrower and more rounded and on occasional vessels the groove between them was accented through the use of a tool. Next came a slight overlapping of bands accompanied by a pinching of the upper border that caused the lower edges to project slightly and produced a pronounced corrugation. Shortly after the appearance of this form the custom of pinching the coil to make an indentation started. The indentations were widely spaced and the contrast between them and later examples is so marked that it led to the name "exuberant" indented corrugation. Synchronous with the introduction of this form was the development of simple designs pinched into the neck coils or incised with a finger nail or an implement or merely rubbed into the surface with a finger while the clay was still moist. At the same time some of the potters were manipulating the coils to produce a waved effect and the necks of some of the culinary pots had alternating series of plain and waved coils. Closely allied to this form and not long subsequent to it was one on which there were alternating bands of plain and indented coils. This entire group, in common with the flat-band forms, was characterized by smooth bodies. It was not long, however, until these varieties of manipulated coils appeared as allover ornamentation. The narrow-coil indented-corrugated, with the corrugations covering the entire outer surface of the vessel, was the last style developed. None of the earlier forms were immediately replaced by new ones after their introduction, but in all cases seem to have persisted for a time and then gradually faded from the ceramic pattern. The group with the various manipulations of the neck coils is represented only in the surface layers of tests 1 and 2. Its occurrence is of little significance because fragments from every type of pottery made at a site are likely to be found in surface debris. No examples were present in the pillar in structure 1 below the surface layer, the material there checking closely with that from tests 1 and 2. Midway in the structure-2 pillar, however, these forms began to appear and were the predominant type in the upper strata. In discussing the fill in structure 2, mention was made of the fact that the pit was used as a dumping place for a short time after the house was abandoned. Then for a while no refuse was deposited there. This was followed by an interval when considerable rubbish was thrown into the depression [20] and included in the material were the potsherds from the vessels with altered neck coils. In structure 12 they were present from top to bottom. Coupled with the evidence from the house types this is a rather clear indication that this group of utility wares made its appearance at about the middle of the Developmental period, perhaps slightly before it, and predominated throughout its latter half.

Three forms of early black on white are present in the stratigraphic material. One is closely related to that from the Chaco Canyon, the second suggests that it may be derived from the first but is usually considered one of the Little Colorado wares, and the third is characteristically Tusayan or Kayenta. The earliest black on white is Modified Basket Maker of the type prevalent in the Chaco region.[21] Not a single decorated sherd of the northeastern Arizona variation with carbon paint was noted. A few pieces from vessels of that type are in the series from the Chaco, but they represent a small proportion. The iron-paint class is the predominant one there as well as in the Whitewater District. Following this ware, and associated with the banded-neck culinary vessels, was the Chaco I, eastern Pueblo I, or Kiatuthlanna black on white. There is no doubt that it was a direct outgrowth from the Chaco type of Modified Basket Maker. The Little Colorado variation represents a group that is found extending west from the Whitewater District to the vicinity of Holbrook, Ariz., and south to St. Johns, Ariz., occurring for the most part in the triangular area bounded by the Puerco and Little Colorado Rivers. Sherds from vessels of this type are abundant on small sites near Houck, Adamana, and Navajo farther west, and in the Milky Hollow and Long H Ranch districts farther south. The base color is more of a gray than that on the Chaco vessels and the lines of the decorations tend to be somewhat heavier. The elements in general are the same, but there are some slight differences in the designs as a whole. The pigment is an iron, in some cases possibly an iron-carbon, mixture. Consideration of the various traits of this pottery suggests that it was a local development strongly influenced by the Chaco pattern. It did not appear in the Whitewater District until the Chaco I form had become well established. Although it is second to the Chaco series, it never constituted a large percentage of the ceramic group as a whole. The Kayenta Pueblo I, or Kana-a black on white, was the last of this early Developmental Pueblo group to reach the Whitewater and it also forms a small percentage, even less than that of the Little Colorado series. During subsequent phases, trends in the black-on-white wares were mainly the result of developments growing out of these three types and a certain amount of blending between them. Toward the end of the Developmental period influences from the San Francisco or Tularosa region in central western New Mexico and from some of the Little Colorado centers farther west were felt in the Whitewater District and the effects are shown by some of the pottery.

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[20] Part I, p. 43.

[21] Roberts, 1929, pp. 118–123.

The burnished-black ware sherds from the stratigraphic tests record an interesting progression. The earliest examples of the form consisted of bowls with a dull black interior and a gray exterior. Their first appearance in the series was in association with the black on white of the Chaco I type. There is no evidence for the form in connection with the Modified Basket Maker, which is interesting because the black-interior gray-exterior bowls were contemporaneous with late Modified Basket Maker in the Chaco area.[22] As the Developmental period continued, black-interior bowls with a gray-brown exterior were introduced, and by the time the manipulated-coil culinary vessels were coming into vogue the black interior was being polished and the exterior had assumed a brownish-red hue. Ultimately this form achieved a highly polished interior and a good red exterior. The steps in the growth of this ware in the Whitewater District are particularly interesting because they parallel those noted in the Chaco Canyon and also those observed at the Long H Ranch,[23] south and a little west from the Whitewater. They differ, however, in the matter of correlation with other forms and horizons in the cultural pattern. The Whitewater examples indicate a degree of lag and appear to be somewhat later, relatively, than those in the other districts. Furthermore, there were no pitchers or jars in the group.

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[22] Roberts, 1929, pp. 117–118.

The black-interior gray-exterior forms did not disappear from the ceramic scene with the development of the subsequent gray-brown, brown-red, and red varieties, but persisted in a minor capacity and evolved through a number of stages in which the gray became lighter and lighter until it attained an exterior comparable to that of the black-on-white wares, the interior being a burnished black. This seems to have been a wholly local development as burnished-black interior white-exterior bowls have not been reported from other sites in the Anasazi province. There may be some relation between this type and one, apparently later in date, that occurs sporadically in small numbers at scattered sites in New Mexico and Arizona but which thus far has not been localized. It is characterized by a black interior, white to cream exterior with heavy, broad-line decoration in a buff to brown slip paint. There are no traces of designs on the Whitewater specimens, though, and the suggested affinity with the other type may be only a superficial resemblance rather than a real relationship. No whole vessels were recovered and the form is represented in the collection only by sherds.

There are a number of vessel shapes in the culinary or utility wares, and modifications and variations appeared from time to time throughout the course of the ceramic industry illustrated by the Whitewater specimens. Some of the larger sizes are not represented by whole pots, but the portions found are sufficient to indicate general shapes and approximate measurements. The smooth-surfaced group had elongated spherical forms with slightly depressed tops and a wide orifice (fig. 1, *a*) that ranged from 10 to 12 inches (25.4 cm. to 30.48 cm.) in height, 9 to 10 inches (22.86 to 25.4 cm.) in diameter, an opening 5 to 6 inches (12.7 to 15.24 cm.) in diameter, and a wall thickness of from ¼ to ⅜ of an inch (6 to 9 mm.). Another common shape consisted of a fairly globular body with a short, squat neck and wide orifice (fig. 1, *b*). The larger sizes in this group range from 9 to 9¾ inches (22.86 to 24.76 cm.) in height, 8¾ to 10 inches (22.22 to 25.4 cm.) in diameter, with a neck height of from 2 to 2¼ inches (5.08 to 5.71 cm.), and an orifice diameter of from 5 to 5½ inches (12.7 to 13.97 cm.). Wall thickness varied from ¼ to 5⁄16 of an inch (6 to 7 mm.). A third shape was that of a globular-bodied pot with a slightly depressed top and wide orifice (fig. 1, *c*). This group was not as numerous as the other two and apparently not as commonly used in this locality. The vessels averaged from 8 to 9 inches (20.32 to 22.86 cm.) in height, 9¼ to 10¼ inches (23.49 to 26.03 cm.) in diameter, and the orifice from 5 to 6 inches (12.7 to 15.24 cm.) in diameter. The thickness of the walls ranged from ¼ to ⅜ of an inch (6 to 9 mm.). A few bowls were also made and used for culinary purposes in this particular group. They were of the deep variety with rounded sides and slightly incurved walls at the rim (fig. 1, *d*). The size range was from 3½ to 4¼ inches

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[23] Roberts, 1931 b, pp. 117–118.

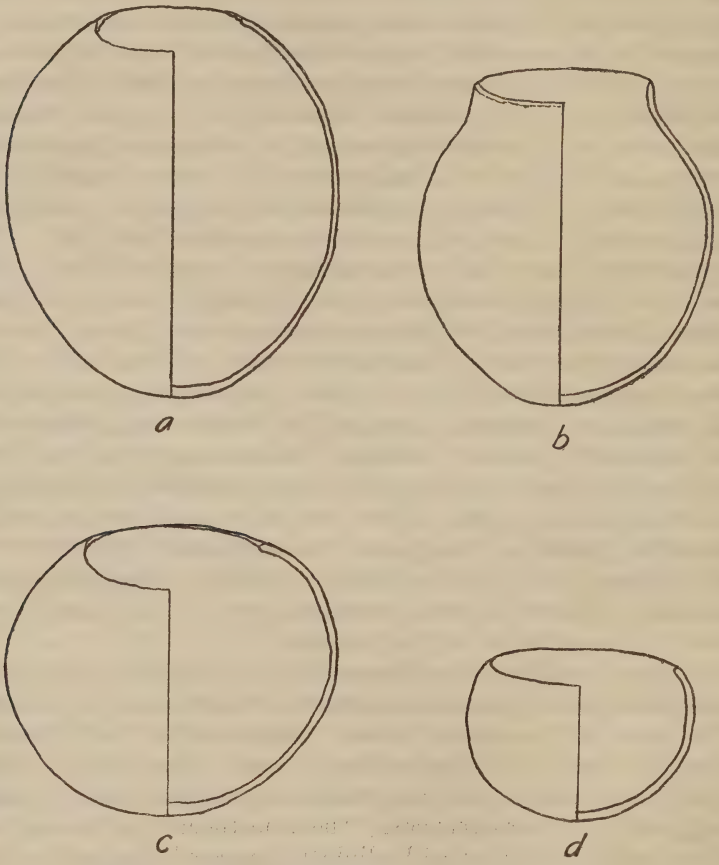

FIGURE 1.—Modified Basket Maker culinary vessel shapes.

(8.89 to 10.79 cm.) for height, 5½ to 6¼ inches (13.97 to 15.87 cm.) in diameter, with a wall thickness of 13/64 to ¼ of an inch (5 to 6 mm.).

Shapes similar to some of those just described were made in smaller sizes. They differ from the larger ones, however, in that they have handles. In some cases a simple, shelflike lug was applied to the outer surface at the shoulder, the place where the neck and the incurving body wall meet, but on most examples the handle is a horizontal, single-loop type. An illustration of the globular body with short, squat neck and wide orifice class with handle is *c*, plate 2. The vessels in this group average about half the size of those with the same shape but lacking handles. The smaller series ranges between 3¾ and 4½ inches (9.52 and 11.43 cm.) in height, 4¼ and 5¼ inches (10.79 and 13.33 cm.) in diameter, with an orifice diameter of from 2½ to 3½ inches (6.35 to 8.89 cm.). Globular-bodied pots with slightly depressed tops and wide orifice in the group with handles (pl. 2, *a*) fall within limits of 4¼ to 5¼ inches (10.79 to 13.33 cm.) in height, 5¼ to 6⅛ inches (13.33 to 15.55 cm.) in diameter, and an orifice diameter of from 2½ to 3¼ inches (6.35 to 8.25 cm.). Differences in wall thicknesses between the larger and smaller forms in this group are so minute that they are negligible. Handled bowls of the culinary wares were of the form illustrated by *d*, plate 2. They were slightly smaller than those without handles and varied in height between 2½ and 3¼ inches (6.35 and 8.25 cm.), and from 4¼ to 5½ inches (10.79 to 13.97 cm.) in diameter. The handles in all cases were fastened to the side of the vessel by the riveting process. That is, while the vessel was still green or moist holes were poked through the side, the ends of the handle loop were inserted in the holes, extending through the wall to the interior, and smoothed into the inner surface of the vessel. The outer surface of the wall and the handle were welded by smoothing the edges of the perforations and the adjoining portions of the handle until they fused into a unified mass of clay.

Other handled forms comprise the type of vessel generally called pitcher. In this group, as in those described above, the body shapes are quite similar to the vessels without handles. The chief difference is in the fact that vertical loop handles were attached to some and not to others. There are globular-bodied pots with short, squat necks (pl. 2, *f*) (the handle is missing from this particular vessel but its former presence is indicated by the places where it was attached), and globular-bodied forms with an indication of a shoulder and longer, tapering necks (pl. 2, *e*). These are the principal shapes in the utility group. The sizes more closely approximate the forms without handles than was the case in the preceding handled examples. Those with the short, squat necks range between 7¼ and 8½ inches (18.41 and 21.59 cm.) in height, 7¼ and 8¼ inches (18.41 and 20.95 cm.) in diameter, with orifices from 3⅞ to 5 inches (9.84 to 12.7 cm.) in diameter. The series with longer and tapering necks is from 7½ to 8½ inches (19.05 to 21.59 cm.) in height, 6¾ to 8 inches (17.14 to 20.32 cm.) in diameter, and has orifice diameters from 3¼ to 4½ inches (8.25 to 11.43 cm.). The range in wall thickness was from 3/16 to ¼ of an inch (4.5 to 6 mm.). The handles are all of the single-loop variety, although in a few cases a double loop was indicated by incising a median line down the center on the exterior. This same trait was noted for a few examples in the series of horizontal handles. Pitcher handles in this group characteristically start flush with the lip of the rim or slightly above it, as shown by *e*, plate 2.

The entire series just described, regardless of shape, size, and the presence or absence of handles, has the same quality of paste, surface finish, and general treatment. The clay was tempered with considerable white sand or light-colored quartz that was ground for the purpose. Surfaces were scraped and rubbed but owing to the quantity and size of the material used in the tempering process tend to be rough and pebbled. The texture of the vessel walls is rather coarse, quite so, in fact, when compared with other Whitewater types but when considered with respect to some of the Mississippi Valley and other eastern pottery it would be called fine. In breaking, the edges tend to crumble and do not have a sharp, straight fracture. This is probably attributable to the large sand or ground-quartz content in the clay. The inner portion of the vessel walls, the core, has a medium- to light-gray streak. The outer surfaces range from a medium dark gray to a very light gray, in some cases are almost a yellowish white. Most of the examples were stained with smoke or coated with soot when found. Traces of "fugitive red" were present on a large percentage of the specimens, although not very distinct beneath the stain and soot. In all respects this group is typical of the Standard Complex of the Modified Basket Maker period.[24]

Similar to the vessels of the preceding group in shape and general appearance, but differing in nature of the paste and surface texture, are culinary pots that were made in the early stages of the Developmental period. They consist of globular-bodied vessels with short, squat necks and wide orifice (pl. 2, *b*) and globular-bodied forms with somewhat longer and more pronounced necks and wide orifice. No complete vessels of the latter shape were found, but there were numerous fragments of sufficient size to establish the form and a little more than half of several different pots is present in a number of cases. This form was well represented in the collection of pottery from the Long H Ranch, the Kiatuthlanna of the Zuñi, in a comparable horizon[25] and seems to be a definite part of the complex in this general area. Numerous sherds from such vessels occur in association with Chaco I and the Little Colorado form of black on white related to it at sites near Houck and in the region just west of the Whitewater district. In some places it is the only culinary form present with the early Developmental black-on-white wares which suggests that the completely smoothed style of finish persisted longer in some sections than in others and that the neck-banding probably came in from the east as a part of the Chaco influence. Vessels with the globular body and short neck range from 6¼ to 7½ inches (15.87 to 19.05 cm.) in height, 7⅛ to 8⅜ inches (18.09 to 21.27 cm.) in diameter, and have an orifice diameter of from 4¼ to 5 inches (10.79 to 12.7 cm.). Exact measurements for the other form cannot be obtained because of the lack of complete specimens, but the heights closely approximated 9½ to 10 inches (24.13 to 25.4 cm.) and the diameters 9¾ to 10¼ inches (24.76 to 26.03 cm.). Wall thicknesses ranged from 3/16 to 5/16 of an inch (4.7 to 7.9 mm.).

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[24] Morris, 1927, pp. 161–167.

Vessels in this group tend to a dark-gray color. The clay was tempered with ground quartz and some powdered potsherds, and the texture of the paste is somewhat finer than that of the Modified Basket Maker group. The surfaces were scraped and rubbed, but are rough because of protruding particles of the material used in tempering. They are not as rough, however, as the preceding forms. When a pot was broken, the edges of the fragments tended to crumble, although the fracture was somewhat sharper than in the case of the Modified Basket Maker. Another feature of this group is that the surfaces occasionally exhibit a sloughing quality and are pitted where small flakes have fallen away. Fragments from vessels of this class are indistinguishable from those from the banded-neck type smoothed sides and bottoms, but can be differentiated from the Modified Basket Maker with little difficulty.

The vessels with banded necks in the larger culinary jars were made in two general shapes. One had a roughly globular body with a vertical-sided neck (fig. 2, *a*) and the other a slightly ovoid body with a neck whose sides had a slight outward curve (fig. 2, *b*). The bands around the neck were broad and flat and as a rule were lightly rubbed. They were never entirely obliterated. In all cases they were definite bands, each making but a single circuit of the vessel wall, and not spiral coils. This feature is in accord with that noted for similar vessels from a comparable stage in ceramic development at other Anasazi sites. Complete jars in the large sizes are lacking in the Whitewater collection. Numerous sherds and sizable portions are available for study and these are sufficient to give a reliable indication of shape, the nature of the bands and general surface treatment, but not actual measurements. It can be stated with reasonable assurance, however, that they approximated a height range of from 12 to 14 inches (30.48 to 35.56 cm.), and a diameter variation of from 11 to 12½ inches (27.94 to 31.75 cm.). The neck bands range from ½ to ¾ of an inch (1.27 to 1.9 cm.) in width and the wall thickness from ¼ to ⅜ of an inch (6 to 9 mm.).

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[25] Roberts, 1931 b, pl. 11, *a*.

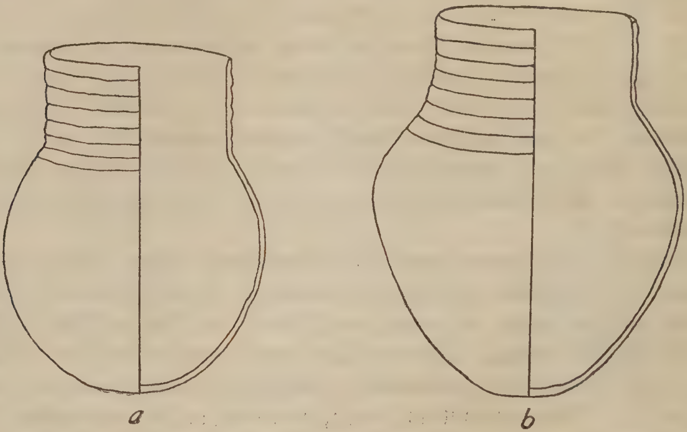
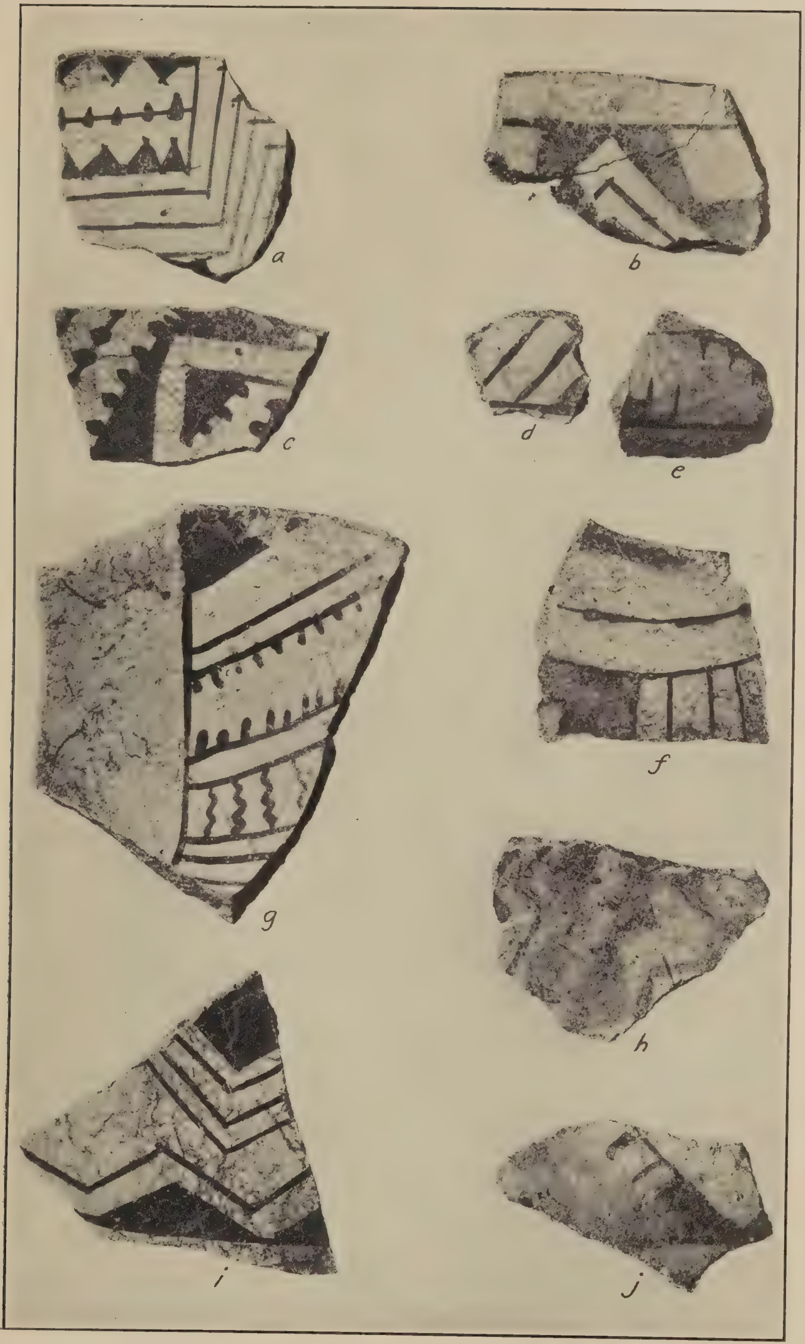


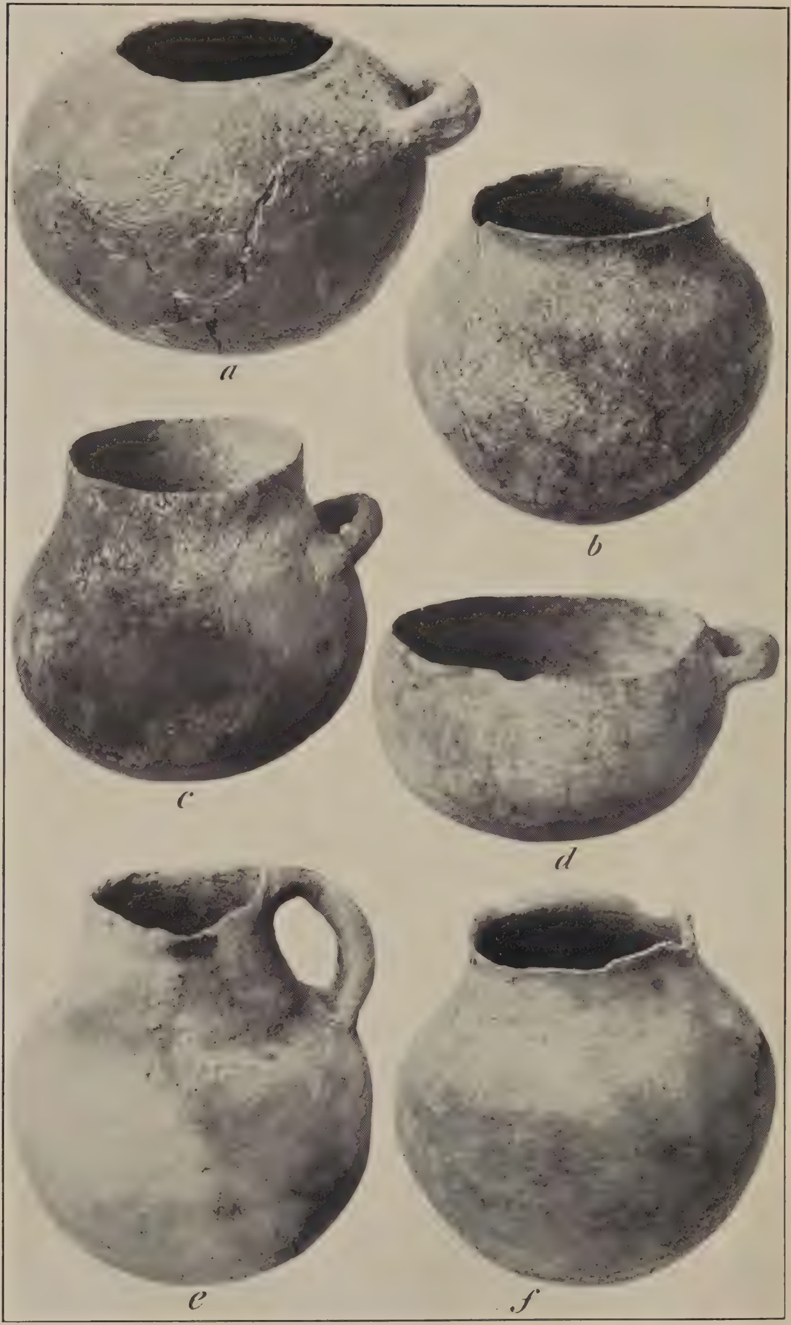
FIGURE 2.—Developmental Pueblo banded-neck culinary vessel shapes.

Pitchers are more numerous in the banded-neck culinary group and they are well represented in the collection. There are a number of shapes. One group is characterized by globular bodies and vertical-sided necks (pl. 3, *a*), the body wall curving inward to form a definite shoulder at the base of the neck. A somewhat similar shape has a globular body, but there is only a suggestion of a shoulder and the neck rises more directly from the body wall (pl. 4, *b*). Globular-bodied pitchers with tapering necks probably constitute the largest group, the neck bands starting just above the area of greatest diameter (pl. 3, *b;* pl. 4, *a*). In some cases the neck tapers inward for about half its height and then rises vertically or curves slightly outward as in plate 5, *c* and *d*. As the period progressed some of the necks became more curved and the ultimate development was the form illustrated by the example *e*, plate 5. As shown by the photographs, the number of neck bands varied from 2, 3, or 4 on

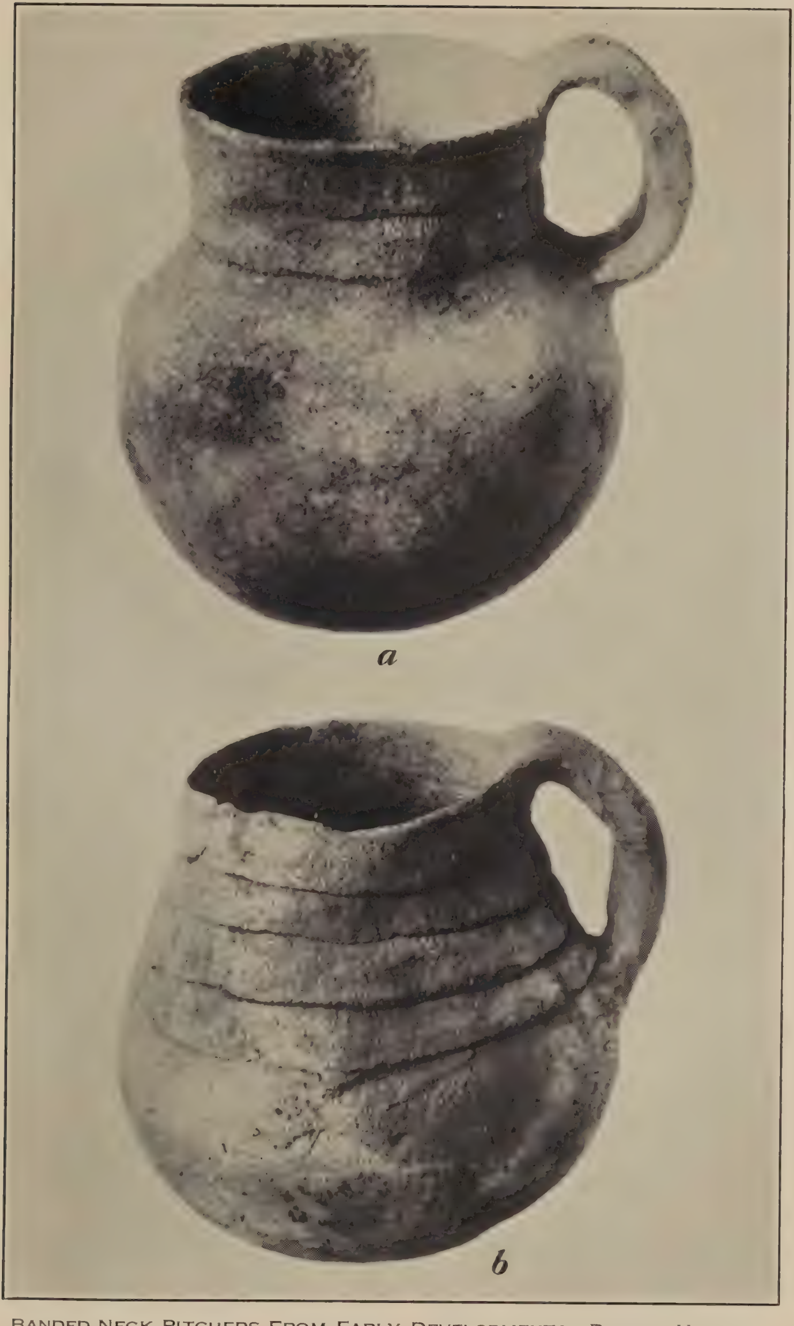


Typical Potsherds From Beginning Developmental Pueblo Wares.

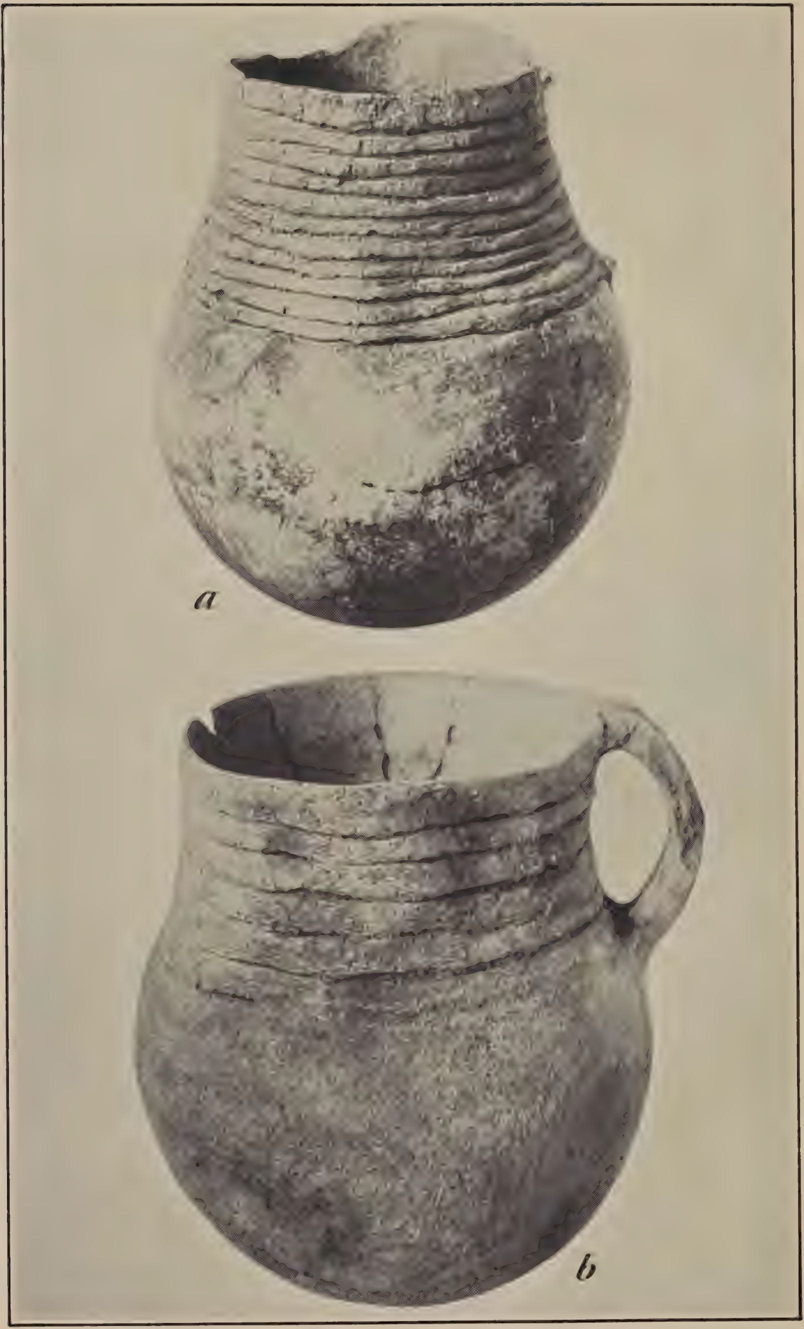
Those in left-hand column are Chaco I; right-hand, Kana-a black on white.



PLAIN WARES FROM MODIFIED BASKET MAKER AND BEGINNING DEVELOPMENTAL PUEBLO HORIZONS.



BANDED-NECK PITCHERS FROM EARLY DEVELOPMENTAL PUEBLO HORIZON.



Developmental Pueblo Banded-Neck Pitchers.

smaller vessels to 7, 10, or 11 on the larger examples. Fragments from the necks of broken pitchers indicate that in some cases there was only one band and it formed the rim for the orifice. The bands on the neck of the pitcher *a*, plate 4, are interesting because they illustrate the practice of emphasizing bands that have been lightly rubbed by using a tool to deepen or accent the grooves. In this instance the treatment was only applied to the top seven bands and to part of the eighth band. The tool was not used on the remaining lower ones, the edges being sufficiently pronounced without additional emphasis. It is possible that a slip on the part of the potter making the pitcher blurred the upper bands and the tool was brought into use to repair the damage and restore the desired appearance. The tooled effect on this particular specimen is not as pronounced as in cases where there was a careful smoothing of the bands followed by the application of an incising implement.

There is considerable variation in size in the pitcher group. Those with definite shoulders and cylindrical necks with vertical sides range from 5 to 7¾ inches (12.7 to 19.68 cm.) in height, 5¼ to 6⅝ inches (13.33 to 16.82 cm.) in body diameter, and have orifices with with 3¼ to 3½ inches (8.25 to 8.89 cm.) diameters. The group with tapering necks varies from 3¾ to 7¾ inches (9.52 to 19.68 cm.) in height. Diameters at the maximum body circumference are from 4⅞ to 6⅝ inches (12.38 to 16.82 cm.). Orifice diameters are from 3⅛ to 3¾ inches (7.93 to 9.52 cm.). Pitchers in the series with necks that taper inward and then rise vertically have heights of 5½ to 7 inches (13.97 to 17.78 cm.), diameters from 5⅝ to 6⅛ inches (14.28 to 15.55 cm.), and orifice-opening diameters from 3½ to 4 inches (8.89 to 10.16 cm.). The concave-neck forms range from 5⅛ to 6¼ inches (13.01 to 15.87 cm.) in height, from 4⅞ to 5½ inches (12.38 to 13.97 cm.) in maximum body diameter, and from 2½ to 3½ inches (6.35 to 8.89 cm.) in orifice diameter. The minimum diameter for the neck will be smaller in all cases than the orifice diameter because of constriction at the midway portion. Wall thicknesses in all the groups vary from 3/16 to 9/32 of an inch (4.7 to 7.1 mm.).

Handles on the pitchers are of two forms, the loop and the flat band. The loop examples occur in the single, the single with median incision to simulate double loops, and double parallel loops. Fragments from broken handles indicate that double loops were sometimes twisted to make a spiral loop handle and in some cases three small fillets were braided in shaping a single piece for attachment to the vessel. The flat-band handles consisted of a single loop that was pressed to make a broad flat ribbon of clay. In the case of these vessels, the handles were also attached by the riveting method and extended from the shoulder or the area of greatest body diameter to or just above the rim. In this they resembled the earlier group.

For some reason no whole specimens of the smooth-bodied culinary vessels with manipulated-neck coils were found. There were numerous sherds and portions of vessels in the fill in house pits and scattered about the refuse mounds, but no more than approximately half of any one example was recovered. Judging from the potsherds most of these jars were in the larger sizes, the group that rarely was used for mortuary offerings and the one in which the percentage of breakage seems to have been highest. This may explain the lack of such jars in the collection. Another factor, however, that probably has a definite bearing on the problem, concerns the remains investigated. Mention of a possible gap between the second and third unit-type structures in the discussion of the house types also called attention to the likelihood of evidence for intervening steps in a number of small house mounds that were not excavated.[26] These represent the stage when vessels of that type would have been in the greatest vogue, as the potsherds scattered over their surfaces indicate. Furthermore, this group belongs to that phase in the Whitewater District when changes were taking place with great rapidity and the style no doubt was of short duration, the progression to the allover corrugation following close on the development of coil manipulation. The portions of jars in the collection show that the shapes were much the same as those for the large-sized banded-neck group, globular bodies with vertical necks and ovoid bodies with slightly outcurving necks. Indications are that the height for these vessels was approximately 10 to 12 inches (25.4 to 30.48 cm.), and the diameter 9½ to 11 inches (24.13 to 27.94 cm.). These figures are based on estimates from the portions of vessels and are not to be regarded as other than reasonably close to the actual measurements.

The designs pinched into the coils were simple chevrons, pyramidal and rectangular figures. The decorations cut into the surface were of the chevron type, diamond-shaped, rectangular frets, or series of oblique parallel lines. This style of ornamentation was fairly widespread. It was not used on a large percentage of the culinary wares in most of the places where it is found but was not uncommon. Evidence throughout the Anasazi province is that it came into prominence late in the Developmental period and, except for one district, lasted only a short time. There is a good showing of the type at some of the small house sites in the Chaco Canyon, particularly those in the vicinity of the Fajada, a butte some 3 miles (4.828 k.) east of the cluster of large communal houses, and some elaborate examples came from Pueblo Bonito.[27] One of the most extensive series thus far noted is in the Tularosa, or San Francisco-Upper Gila, district in central-western New Mexico.[28] There is some indication that the style started in that section and spread from it to other parts of the area. There is no doubt that it persisted there longer than elsewhere and continued for a time in the early part of the Great Pueblo period. Some attribute the development of this method of ornamentation to the peoples occupying the region just south of the Tularosa in the Mogollon district. Considerable use was made of it there, but the style of designs is somewhat different.[29] Also, if the latter is as much older than the former as some think it to be, the influence of the one on the other, jumping a gap of several centuries, is hard to explain. On the other hand, if the Mogollon dates are later, and certain features tend to indicate that may be the case, the derivation of the Tularosa form of incised decoration from that district is more plausible.[30] The two are so close geographically and culturally, however, that the developments may well have stemmed from a common trait and placing them in separate categories may be drawing too sharp and misleading a distinction.

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[26] Part I, p. 171.

Vessels in the group with manipulated-neck coils range from a medium dark to light gray in color. The clay was tempered with some powdered rock and ground potsherds. The texture of the paste is medium to coarse. The exterior surfaces were scraped from the bottom neck coil over the remainder of the body. The smoothed areas were not thoroughly polished, but they were rubbed after scraping and there are small areas suggestive of a polish. The surface is rough, although not as rough as in the case of preceding forms. Occasional pieces of material used in tempering project from the surface. Because less of the powdered rock and more pulverized potsherds were used in the paste the stippled appearance common to earlier forms is not as pronounced. Breakage tends to be along sharper lines and there is not as marked a tendency for the edges to crumble as in some of the other types. Firing seems to have been better as there is not as definite and extensive a dark core in the paste of sherds from these vessels and smoke smudges are not as common.

The group composed of vessels with allover corrugation and the manipulation of coils, the extension of features described in the preceding series to the entire outer surface, exhibits a variety of sizes and shapes. Many of the latter are a continuation of those made in older types of culinary jars, but there are some that show modification. The large sizes, represented only by potsherds and portions of vessels up to approximately half the complete container, were made in two shapes. One consisted of a full body with rounded bottom and walls tapering to a wide orifice with outcurved rim, the area of greatest diameter being at approximately the middle line of the jar (fig. 3, *a*). The other had a rounded bottom, sides tapering to a wide orifice with slightly outcurved rim, the line of greatest diameter occurring about two-thirds of the distance down the side from the top (fig. 3, *b*). Those in the first group had a height range between 10½ and 12 inches (26.67 and 30.48 cm.), diameters from 12¼ to 13¾ inches (31.11 to 34.92 cm.), and orifice diameters from 8 to 9½ inches (20.32 to 24.13 cm.). The second group averaged somewhat larger with a height range of 12 to 14 inches (30.48 to 35.56 cm.), diameters from 12⅜ to 14¼ inches (31.43 to 36.19 cm.), and orifice diameters from 8⅛ to 9⅝ inches (20.63 to 24.44 cm.). Wall thicknesses range from 3/16 to 11/32 of an inch (4.7 to 8.7 mm.). Most of these examples had alternate bands of plain coils and "exuberant" indentations. One combination consisted of 3 plain coils and 9 indented coils, repeated several times. Another had alternating bands of 4 indented coils and 4 plain coils on the upper part of the jar while the lower, from the line of greatest diameter, was all indented coils. A still different combination had 6 indented coils and 7 plain coils recurring from top to bottom. Apparently there was no particular significance in the different numbers as those used and the variation in association did not follow a definite pattern from vessel to vessel.

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[27] Pepper, 1920, fig. 121.

[28] Hough, 1914, pls. 6, 7.

[29] Haury, 1936, a, b.

[30] Results of recent work in the Mimbres area in southwestern New Mexico, particularly in some Mogollon sites, add weight to the belief that the Mogollon pattern may be later than previously postulated. See Nesbitt, 1938.

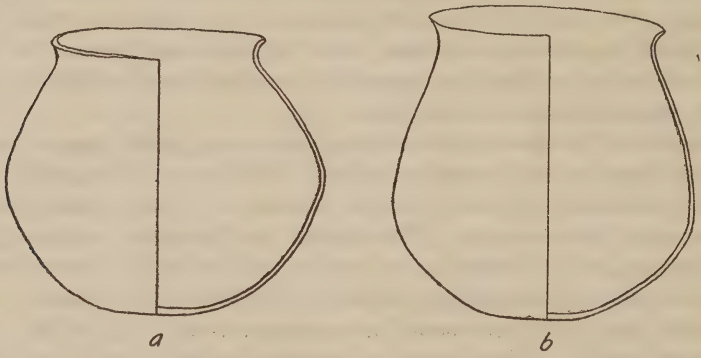


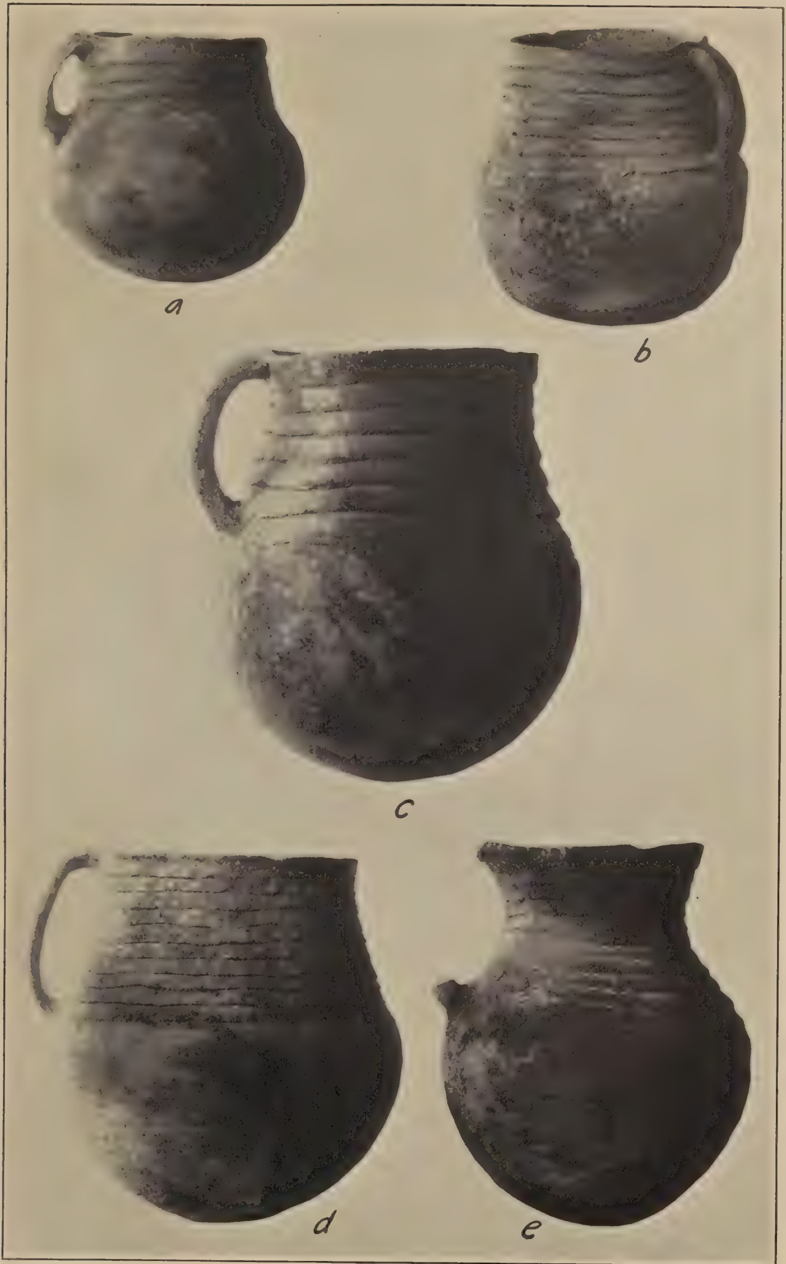
FIGURE 3.—Corrugated culinary jar shapes of late Developmental and early Great Pueblo phases.

Shapes in the smaller jars in this group were a little more diverse than in the case of the larger ones. The forms described for the latter are noted, but there are others in addition. The majority have rounded bottoms, although a few were provided with a flattened area on which to rest. Some have rather globular bodies with a relatively short neck (pl. 7, *f*); others a bowllike bottom with sides tapering to the orifice from the line of greatest diameter (pl. 7, *c*, *e*), and an outcurved rim; and some a globular body with a longer neck, the sides tapering for about half the distance and then rising vertically to a direct rim (pl. 7, *a*). A minor form was that with a globular body with a wide orifice and outcurved rim with no neck (pl. 7, *b*). This shape was more prominent in the series with finer coils and smaller indentations that was subsequent to the present group, judging from potsherd evidence. A good example of the flat-bottomed form is *b*, plate 6. This vessel also exhibits another feature occasionally present on some in this group, namely, the small lug handle attached to the rim. The latter occurs on various forms from the earliest to the latest and does not have any particular significance with respect to horizon or type. On all of these specimens the coils are relatively large and the indentations rather widely spaced. Most of the indentations were obtained by pinching the moist coils of clay with the fingers, but occasionally the indentation was emphasized through the use of some tool, as on the bottom of *c*, plate 7. This vessel also illustrates the style of ornamentation in which the bands were wiped with a finger to produce a design. These are not as effective as those produced by incision with a tool, but some of the potters occasionally resorted to the method for making a decoration. A rather crude form of alternating indented and plain coils is shown by *e*, plate 7. The pitcher *d*, plate 7, is a better example of that style, however. The size range in this group was not great. The heights ranged from 4½ to 7 inches (11.43 to 17.78 cm.), and the diameters from 4 to 6 inches (10.16 to 15.24 cm.). The orifice diameters were from 3¹⁄₁₆ to 4¼ inches (7.77 to 10.79 cm.). Wall thicknesses were from ³⁄₁₆ to ⁵⁄₁₆ of an inch (4.7 to 7.9 mm.).

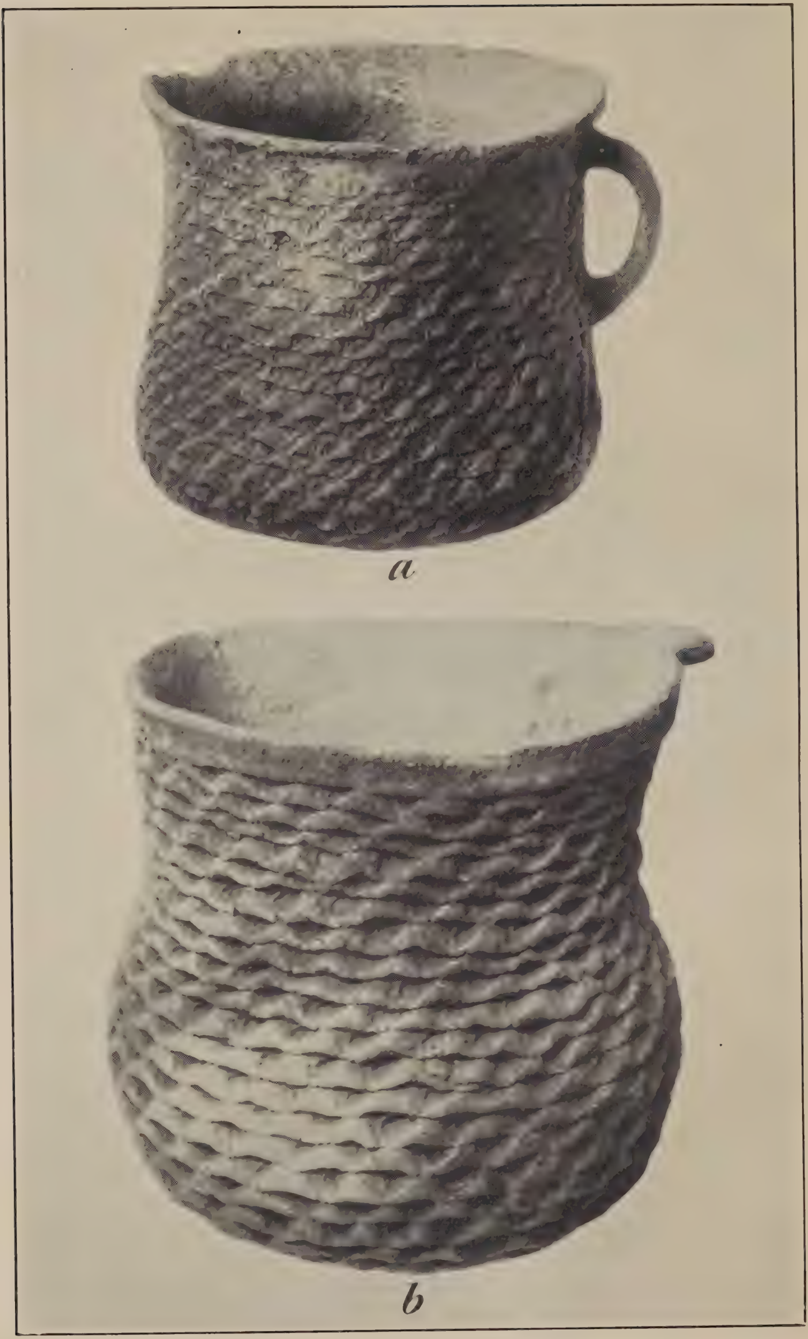
Pitchers in this series had the same general body shapes and characteristics as the other vessels. The commonest was that illustrated by *d*, plate 7. The chief distinction in most cases was the addition of a handle. The latter as a rule was the single-loop variety, although a few had the simulation of double, parallel loops through the incision of a median line and some actually had double, parallel loops welded together. Most of the handles started at the edge of the rim or slightly below it, not above, as noted for examples in preceding series, and were fastened to the side by the riveting method already described. The pitcher or mug *a*, plate 6, is unique in the series. It is flat-bottomed, almost cylindrical in form and has a slightly outcurved rim. Some of the indented-corrugated potsherds in the collection may be from similar vessels but none are of sufficient size to warrant the conclusion that they are. Those big enough to indicate the type vessel are obviously from other forms. Hence it seems that very few of this shape were manufactured by the local potters. Why this should be is not known because the form may well be derived from that illustrated by *b*, plate 6, and it was made in sufficient quantities to warrant acceptance of the later shape with handle. Pitcher heights in general range from 5½ to 7 inches (13.97 to 17.78 cm.), and maximum diameters from 4⅜ to 6 inches (11.11 to 15.24 cm.). Orifice diameters are from 3½ to 4¼ inches (8.89 to 11.43 cm.). Wall thicknesses are 3/16 to 5/16 of an inch (4.7 to 7.9 mm.).

One curious practice in this district was the making of shallow dishes or bowls from the bottoms of broken culinary vessels. When the upper parts of jars were damaged so the container was no longer serviceable, the bottoms were removed, the edges smoothed, and they were continued in use as saucers or plates. Two examples are illustrated in plate 8. One was from a vessel with a plain-band bottom, (pl. 8, *a*, *d*), and the other had been part of a jar with "exuberant" indented corrugation (*b*, *c*). The sides of large jars, both culinary and nonculinary, were treated in the same way and occasionally a portion of a bowl was shaped into a small saucer. Since these dishes were obviously efficient and useful it seems strange that similar ones were not made as original pieces rather than as adaptations from broken vessels.

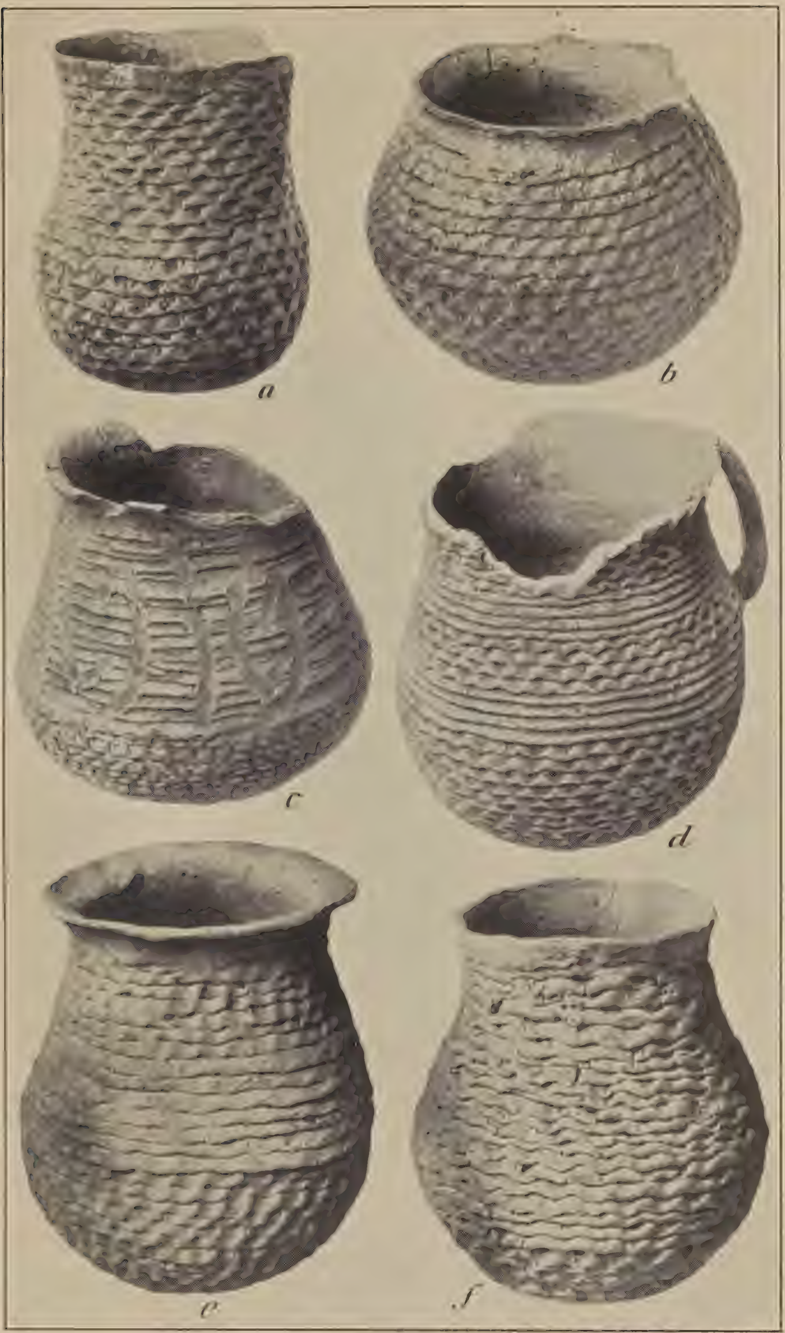
The paste texture, material used in tempering, and general characteristics of this group have no perceptible differences from similar traits in the group of manipulated-neck coil smooth-bodied wares. The main variation, if any, is in the likelihood of a larger percentage of pulverized potsherds in the tempering material mixed with the clay than was the case with the older forms. This can only be determined by study with the microscope and polarized light; it is not apparent to the naked eye or even with the aid of a hand glass. Throughout the course of southwestern pottery the culinary vessels have had a coarser texture and a rougher surface finish and there is no doubt that these characteristics are correlated with the matter of function. The reaction to continued effects of heating was probably more favorable in vessels of this type, not only from the action of fire on the container itself but from its quality as a conductor as well. The roughened surfaces, particularly in the case of the allover indented-corrugated vessels, would make them easier to lift about and with less danger of slipping from the hands when the latter were wet



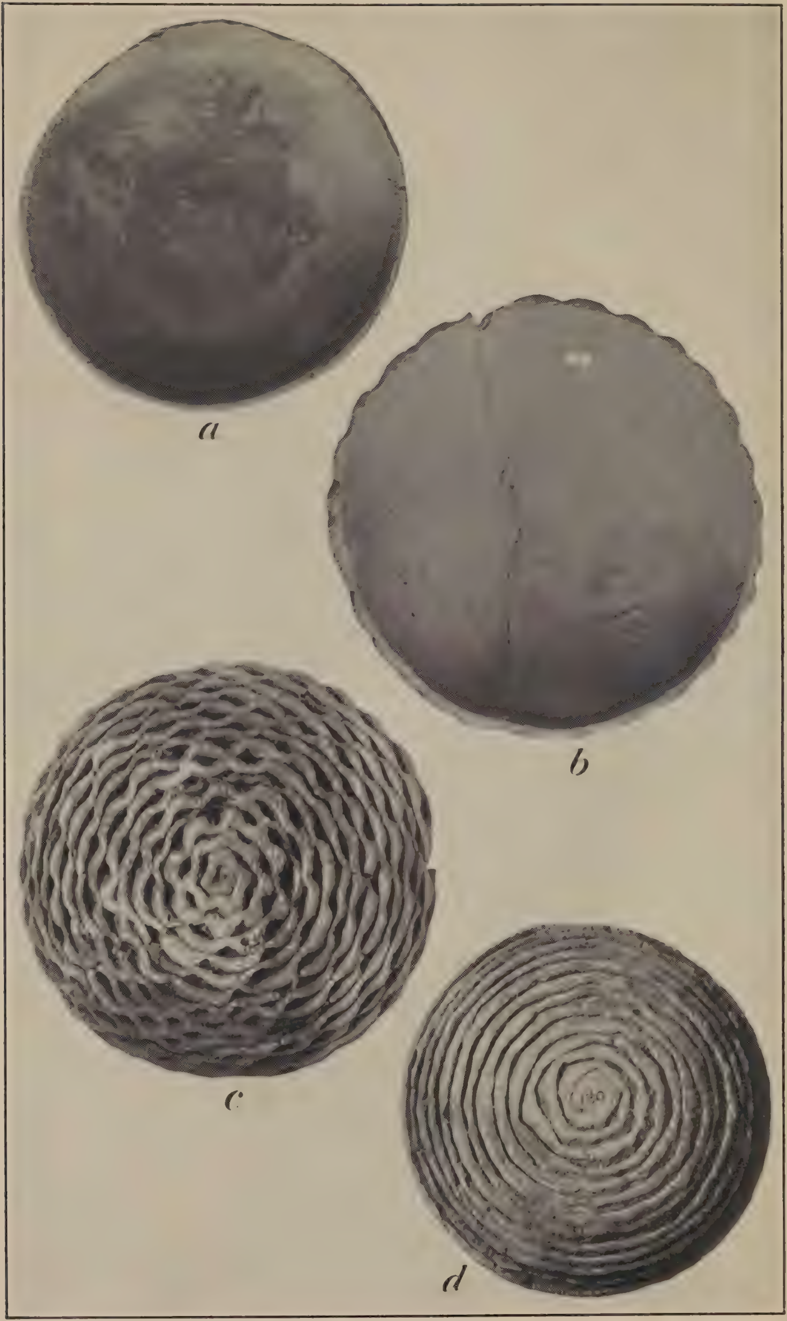
DEVELOPMENTAL PUEBLO PITCHERS.



CORRUGATED PITCHERS FROM END OF DEVELOPMENTAL AND BEGINNING OF GREAT PUEBLO PERIOD.



LATE DEVELOPMENTAL PUEBLO AND EARLY GREAT PUEBLO CORRUGATED VESSELS.



Bowls Made From Bottoms of Broken Culinary Jars.

and greasy. The indented corrugations would have a tendency to increase the amount of surface exposed to the heat, but whether or not this was sufficient to make a perceptible increase in the cooking qualities is a problem still to be solved. Laboratory experiments with proper equipment would show how much difference, if any, occurred between the smooth and corrugated body forms in the transmission of heat from the fire to the contents of the vessel.

The nonculinary wares exhibit a greater variety of forms and sizes than the culinary group. The potters made numerous miniature vessels as well as those large enough for actual use. The group as a whole includes jars, pitchers, canteens, seed jars, ladles, scoops, and bowls. In each of these classes there are a number of different styles and shapes. The bowls are the most consistent, but even they show some variation. All things considered, however, the nonculinary group in the Whitewater District is not characterized by as many different shapes and forms as in some other sections where there are remains of comparable horizons. The main reason for this is probably to be found in the peripheral nature of the Whitewater District and its definite lag in various features. Centers that influenced the ceramic arts in this locality had no doubt passed the stage in which there was considerable experimentation and diversity in shapes and had settled on the more conventional forms, and it was from the latter that the Whitewater potters received their stimulus. The effigy types and eccentric vessels common to the beginning stage of the Developmental period in the nuclear portions of the Anasazi province are missing here. Evidence from those places is that such forms were no longer being manufactured at the time the Whitewater settlements were started. Hence the lack of similar vessels. In general it may be said that the greater variety of vessel shapes in the nonculinary wares is probably due to the fact that the potters were less restricted by functional requirements than they were in the case of the culinary vessels where serviceability and efficiency were essential and as a consequence strove for containers that were both pleasing in appearance and useful. This group of wares supplied the vessels upon which decorations were painted and the fact that they were to be the background for designs probably had an effect on the care with which the pots themselves were made. Artisans engaged in developing and perfecting good designs would also be inclined to give more attention to the objects on which they were to be placed, with the result that better forms evolved.

The miniature vessels as a class are considered as part of the nonculinary group, although some of the specimens are of such a nature that they actually exhibit more of the qualities of the culinary division in the matter of paste and surface finish. Their size is such that they would not have been suitable for actual use in cooking. A majority of the miniature vessels are of the pitcher type. Those with undecorated surfaces and culinary features in their paste and general appearance occur in several shapes. The commonest form is that with a globular body, cylindrical neck, and wide orifice (pl. 9, *f*). A close second is the globular-bodied form with short, cylindrical neck and medium-sized orifice (pl. 9, *e*). Another group comprises those with a globular body and tapering neck with medium to small orifice as illustrated by the specimen *d*, plate 9. An elaboration of the latter shape is found in examples with longer tapering necks and small orifices such as *c*, plate 9. This form is somewhat later in the sequence than that represented by *d*, although the latter shape appeared sporadically as long as miniature forms were made. Another characteristic shape in earlier stages was that of the so-called slipper or bird-form pitchers (pl. 9, *a*, *b*). They occur in both the miniature and larger sizes, but are more common in the group of small vessels. They are widely distributed in the Anasazi province and seem to be typical of the early Developmental period. The form persisted into later stages but did not have the prominence then that it did earlier. Later examples are generally in the larger-sized group and are usually painted with some simple decoration.

Handles on the miniature pitchers in the unpainted group have the same general characteristics noted for handles on the various examples of the culinary pitchers. Most are of the single-loop variety, round or oval in cross section, and extend from the rim to the shoulder. There are a few examples of the double-loop variety, but none with a simulation of the double loop produced by incising. In this group, as in others, sequence differences are indicated by the place where the handle is attached to the rim. The oldest forms are those where it starts from the extreme margin. Later examples have the attachment slightly below the rim and as the period progressed it was made still farther down the side of the neck.

The size range in the vessels in this group was not great. The ordinary pitcher forms (pl. 9, *c* to *f*) have a height range of 3⅜ to 5½ inches (8.57 to 13.97 cm.). The latter is really somewhat above the average and this particular specimen, *c*, might be considered as a small example in the regular series rather than in miniature. Body diameters are from 3 to 3¾ inches (7.62 to 9.52 cm.), and orifice diameters from 1 9/32 to 3 3/16 inches (3.25 to 8.09 cm.). Wall thicknesses are from ⅛ to ¼ of an inch (3.1 to 6.3 mm.). Bird-shaped pitchers range from 2 to 2¾ inches (5.08 to 6.35 cm.) in height and from 3 to 3¼ inches (7.62 to 8.25 cm.) in length. Body width is from 1 1/16 to 1⅝ inches (2.69 to 4.12 cm.).

The miniature pitchers in the painted wares are predominantly of the bird shape, although none are sufficiently detailed to be considered effigy forms. The representation is more formalized with the body indicative of the bird shape and the neck placed in a position corresponding to that on the living model, but there was no molding of distinctive features such as the head, wings and tail. In a few cases, as in the examples illustrated in plate 14, *a*, *c*, *d*, the wings and breast are suggested by slight protuberances at the proper places in the vessel wall. Other shapes in this series consist of globular bodies with tapering necks and small orifices (pl. 12, *a*) and rounded-bottom forms with wide, tapering necks that are almost variations of a mug (pl. 14, *b*). The latter probably is the result of difficulty of manipulation of the clay in such small objects rather than an intentional attempt at a muglike vessel. Handles in this group are all of the single loop, round or oval cross section, variety. No parallel double loops or simulated double loops were observed. As on the plain examples, the handle extends from the lip of the rim to the upper part of the body in the older forms and from a point on the neck below the edge of the rim to the shoulder on the later types. The normal type pitchers range from 2¼ to 3½ inches (5.71 to 8.89 cm.) in height and from 1⅞ to 2½ inches (4.76 to 6.35 cm.) in diameter. The bird-shaped types have heights from 1⅞ to 3 inches (4.76 to 7.62 cm.), body lengths from 2 to 3 inches (5.08 to 7.62 cm.), and body widths from 1⅝ to 2¼ inches (4.12 to 5.71 cm.). Wall thicknesses in the group as a whole are from 3/16 to 5/16 of an inch (4.7 to 7.9 mm.) The paste texture, material used in tempering, and general structural features are the same as for the larger types of specimens and will be discussed in the paragraphs pertaining to those forms.

Large jars, such as were used for storage purposes and as containers for water, are represented only by fragments and portions of vessels. There are no whole specimens, but the pieces in the collection give clear indication of the shapes and types made in the Whitewater District. The plain forms associated with Modified Basket Maker culinary potsherds suggest two shapes characteristic of that phase in ceramic development. One is characterized by a body in which the lower portion, extending from the line of greatest diameter to the bottom, is between a hemispherical and a half-oval form. The upper part is slightly flattened and turns upward to make the tapering neck (fig. 4, *a*). The other shape consists of a globular body with a constricted, bulbous neck (fig. 4, *b*). There were no indications of handles for these vessels, although similar forms in other localities were equipped with down-raking lug handles and those of the horizontal, single-loop form. There were no suggestions of painted decoration on any of the pieces. The paste texture was similar to that of the culinary jars of the Modified Basket Maker series. The clay was tempered with white sand or pulverized quartzlike rock and projecting pieces of this material impart a characteristic stippled appearance to the surface. The surfaces were scraped and rubbed but do not seem to have been polished. Upon completion, after firing, they were given a coating of the "fugitive red."[31] Only approximate measurements can be given for these jars. The type with tapering neck averaged about 15 inches (38.1 cm.) in height and 14 inches (35.56 cm.) in diameter. The necks were from 2¼ to 2½ inches (5.71 to 6.35 cm.) long (this is actual measurement as a number of them were found) and the orifices from 2½ to 3 inches (6.35 to 7.62 cm.) in diameter. Wall thicknesses were from ¼ to ⅜ of an inch (6.3 to 9.5 mm.). Jars with constricted, bulbous necks do not seem to have been quite as large. They approximate a 12½-inch (31.75 cm.) height and a diameter from 11½ to 12 inches (29.21 to 30.48 cm.). Necks were 2½ to 2¾ inches (6.35 to 6.98 cm.) high. The maximum

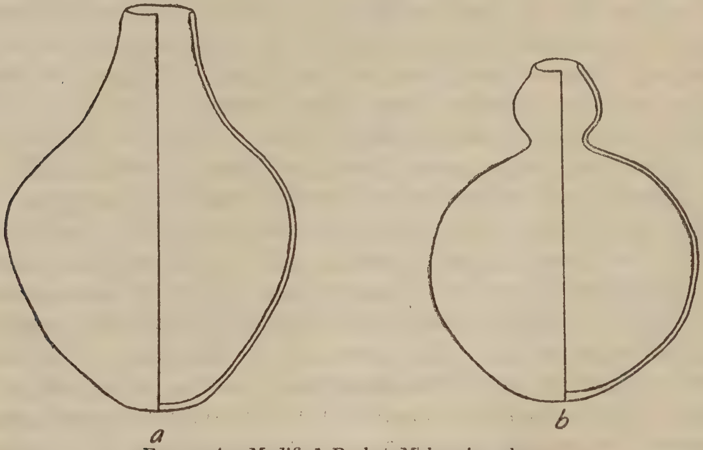


FIGURE 4.—Modified Basket Maker jar shapes.

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[31] This seems to be the type of ware recently christened Lino Fugitive Red, Colton and Hargrave, 1937. In the remarks on the type the writers err, however. They state, *ibid.*, p. 193: "The only way this red color could be produced on vessels fired in a reducing atmosphere would be by *painting the vessel after firing* since the paint would turn gray if fired. This theory is opposed to that offered by Roberts (1929, p. 9, 10)." In describing this type in 1929, the writer stated: "Another characteristic feature of the surface treatment was the application of a red wash ("fugitive red" as it is known to the archeologists of the Southwest) to the exterior of vessels. Because it was not fired into the surface and made permanent it is not apparent, or else is very indistinct, on many of the fragments found." (Roberts, 1929, p. 110, not p. 10, as given by Colton and Hargrave.) What obviously happened is that the latter confused two types—one, the vessels with an orange-red to red tone, as described in preceding pages in this report and also on pages 109–110 in the 1929 paper, that resulted from overfiring, and two, those that were treated with a red wash after firing. They are distinct forms.

diameter at the swollen portion was 2¾ to 3 inches (6.98 to 7.62 cm.), and the orifice diameter ranged from 1¾ to 2 inches (4.44 to 5.08 cm.). Wall thicknesses were the same as for the other style. An interesting structural difference between the two forms is that the tapering neck on the one was made as a part of the jar, the coils being a continuation of those used in building up the vessel, while on the constricted-neck examples the neck appears to have been fashioned separately and then welded to the body.

The large jars of the painted series have a number of shapes. Those made at the beginning of the Developmental period are similar to the forms found in Chaco I and other variations of the eastern style of the pottery better known as Pueblo I. There is one example of this group in the Kana-a black on white and none for the Little Colorado. One shape is a continuation of the first described for the Modified Basket Maker (fig. 4, *a*). The body is slightly more rounding and the neck a little less tapering (fig. 7), but the main contours of the jar are essentially the same. The commonest shape, judging from the potsherds, was that of an ovoid body with very short, squat neck; really more of a pronounced rim for the orifice than a neck (fig. 5, *a*). Associated with this was one with an ovoid body with smaller, slightly pointed bottom, a suggestion of a constriction in the walls just above the area of greatest diameter, and a definite, though short neck (fig. 5, *b*). Following these were shapes that unquestionably were derived from the preceding examples. One was an ovoid form with a slight constriction and a secondary swell in the upper portion of the walls, midway between the area of greatest diameter and the base of the neck, and a short neck with direct rim (fig. 5, *c*). The other tended toward the globular-body form but still had a trace of the constriction and a slight secondary swelling in the upper portion. It also had a short neck with direct rim (fig. 5, *d*). These four shapes were typical of the Developmental period in the Chaco Canyon. The first (fig. 5, *a*) is represented by vessels from a pit house in the floor of the Canyon,[32] the structure that yielded charred beams giving the dendrochronological date 777±10,[33] and numerous sherds from similar jars occur in refuse mounds at sites scattered over this general region. The form is also present in the Long H Ranch area southwest from the Whitewater District[34] and occurs in the early Developmental remains in the Piedra area in southwestern Colorado.[35] The shape seems to be characteristic for that general stage in the groups that were under a strong influence from the Chaco pattern. The second (fig. 5, *b*) also was a Chaco form, but does not appear to have had as wide a distribution as the first. On the other hand, *c*, figure 5, was made at about as many places as the first. It occurs in the Chaco, in the Piedra region, and in the Whitewater.

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[32] Judd, 1924, pl. 4, *a*.

[33] Douglass, 1935, p. 51. See Part I, pp. 262–263.

[34] Roberts, 1931 b, pp. 124–125.

[35] Roberts, 1930.

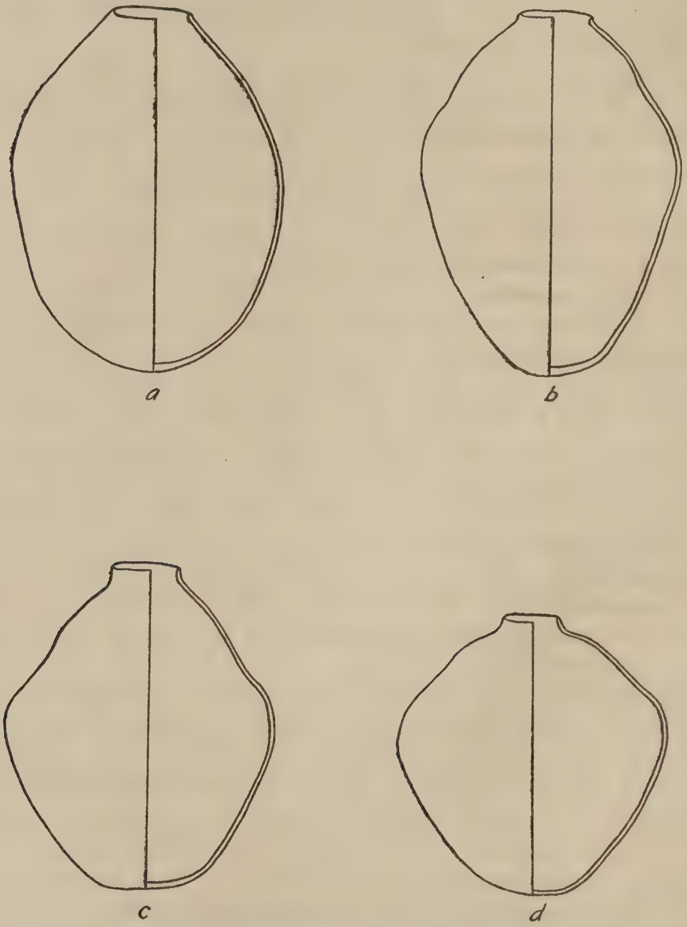

Figure 5.—Developmental Pueblo jar shapes.

The last shape (fig. 5, *d*) had a wide distribution and unquestionably was the forerunner of typical body forms in subsequent stages, the globular body with cylindrical neck (fig. 6, *a*) and the globular body with slightly depressed top and cylindrical neck (fig. 6, *b*). The latter represent the ultimate jar developments in the Whitewater District and also are typical forms for the Great Pueblo horizon in the Anasazi province. Neither of the first two forms seems to have had handles, but most of the others did. The flat-band horizontal handle was the chief form. Some vessels only had one. In most cases, however, there were two placed on opposite sides at approximately the area of greatest diameter or slightly below it. Some of the later types, toward the end of the Developmental period when the globular body with cylindrical neck was the style, were equipped with indented handles, "hand holds" perhaps is a better word. These were made while the walls of the vessel were still green, that is, before they had dried sufficiently to lose their pliancy. The side of the jar was pushed in over an area large enough to admit several fingers of the hand, care being taken not to perforate the wall, and thus provide an easy means for lifting it. This treatment was common in the Chaco Canyon, particularly during the Great Pueblo period, and in fact was quite widespread in the Anasazi area.

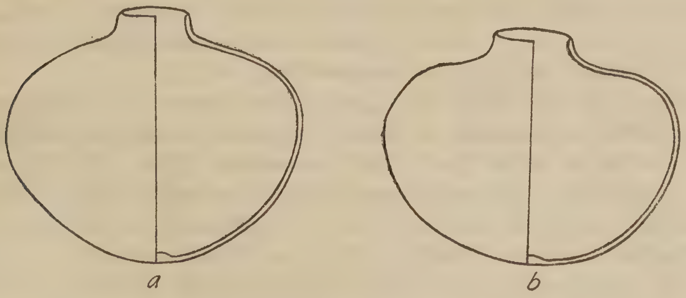

FIGURE 6.—Great Pueblo jar shapes.

Surfaces on these jars were scraped and smoothed and all traces of the coils from which they were made were obliterated. In most cases the vessels had a slip, a wash of "liquid" clay containing some kaolin to lighten the color, that was applied to the surface after it was smoothed. This served as a background for the decoration. Both the slip and the paint for the design were added to the vessel before it was fired. The slip on the earliest forms is irregular in quality. It tends to be thin in places and thick in others with scattered flecks of undissolved material. Later the slip became more consistent, was applied evenly and, because it was appreciably thicker, attained an almost enamellike quality. Subsequently a thinner mixture was used and there is a tendency for the base gray color of the vessel to show through. With the introduction of the slip the practice of polishing vessels with smooth stones came into vogue and as a result the wares have a more finished appearance. Sometimes the polishing was done before and sometimes after the application of the slip wash. Occasional specimens suggest that they were polished both before and after and that their smooth, shiny surfaces are attributable to that factor. The paste texture in most of these vessels is medium to fine; some of the later examples are particularly fine and compact. Pulverized potsherds supplied most of the material used in tempering the clay and this seemingly enabled the potters to knead the mixture into a less granular type of paste. Breakage occurs along sharp lines and there is little crumbling of the edges of the fracture. As a matter of fact, the edges on many potsherds from vessels of this class are so hard and sharp that they will cut a person's finger if handled carelessly in the washing process. Many of the fragments show a dark core to the paste. In some cases it is so wide that a cross section appears as a dark body bordered by two thin lines of white, in others it is merely a narrow streak in the center. Some potsherds do not exhibit the feature at all. Variations in firing are responsible.

Most of the vessels in this group were large. For some of the shapes the measurements are based on partial specimens, but enough is present to make the figures fairly accurate. Those with the ovoid-body shape (fig. 5, *a*) were from 14 to 16 inches (35.56 to 40.64 cm.) in height, 11 to 13 inches (27.94 to 33.02 cm.) in diameter, and orifice diameters were from 3 to 4 inches (7.62 to 10.16 cm.). As a rule the orifice was more oval than circular in contour. The rim around the orifice varied from 1/8 to 1/4 of an inch (3.17 to 6.35 mm.) in height and had approximately the same thickness at the base. It tapered slightly to the lip and measurements for the latter average one-half millimeter less than those for the base. Wall thicknesses ranged from 7/32 to 23/64 of an inch (5.5 to 9.1 mm.). The jars with ovoid body, tapering bottom, and slight constriction in the upper walls (fig. 5, *b*) had a height range from 15 to 17 inches (38.1 to 43.18 cm.), diameters from 12 to 14 inches (30.48 to 35.56 cm.), neck heights of from 1/2 inch to an inch (1.27 to 2.54 cm.), and orifice diameters from 2½ to 3½ inches (6.35 to 8.89 cm.). The latter more consistently approximated the circular form than did the other group. The somewhat similar shape (fig. 5, *c*) was made in sizes 14 to 16 inches (35.56 to 40.64 cm.) in height, 13½ to 15½ inches (34.29 to 39.37 cm.) in diameter, neck 1/4 to 3/4 of an inch (6.3 to 19 mm.) in height, and orifice diameters of 2¼ to 3¼ inches (5.71 to 9.52 cm.). Wall thicknesses in both the *b* and *c* shapes were from 13/64 to 3/8 of an inch (5.1 to 9.5 mm.). The globular body with slightly depressed top (fig. 5, *d*) is a shape in which the height measurements are consistently less than the maximum diameter. Heights in this group range from 11½ to 13½ inches (29.21 to 34.29 cm.) and diameters from 12½ to 15½ inches (31.75 to 39.37

cm.). The stubby necks range from ½ of an inch (1.27 cm.) to 1 inch (2.54 cm.) in height. Orifice diameters are from 2½ to 3¾ inches (6.35 to 8.89 cm.). Wall thicknesses are from 3/16 to 23/64 of an inch (4.7 to 9.1 mm.). The jars with globular body and cylindrical necks (fig. 6, *a*) have a height range between 14½ and 16½ inches (36.83 and 41.91 cm.), diameters from 16¾ to 18⅝ inches (42.54 to 47.30 cm.), and neck heights from 1 to 2 inches (2.54 to 5.08 cm.). Orifice diameters are from 2½ to 3½ inches (6.35 to 8.89 cm.) and wall thicknesses from 7/32 to ⅜ of an inch (5.5. to 9.5 mm.). The group with globular bodies and slightly depressed tops (fig. 6, *b*) are from 11 to 13½ inches (27.94 to 34.29 cm.) in height, 13¾ to 18¾ inches (34.92 to 47.62 cm.) in diameter, ¾ inch (1.90 cm.) to 1¾ inches (4.44 cm.) neck heights, and 2¾ to 4 inches (6.98 to 10.16 cm.) for the orifice diameters. Wall thicknesses range from 13/64 to 23/64 of an inch (5.1 to 9.1 mm.).

Pitchers of the standard sizes in the nonculinary wares have a variety of shapes. One curious form has a three-lobed body with cylindrical neck and medium-sized orifice (pl. 10, *a*, *b*). There were only a few examples of this body type, but enough more were represented in the potsherds to show that it was definitely a part of the local complex and not accidental. The texture and surface finish on these vessels is strongly suggestive of Modified Basket Maker, yet the association in every case was with typical Developmental Pueblo vessels. These pitchers may be an actual survival from the earlier horizon, pieces that were kept as heirlooms or antiques because of their odd shape. On the other hand it is possible that they were made in the early stages of the Developmental and, because much of the Modified Basket Maker technique was still in use, give the appearance of belonging to that period. The shape is not common in the Anasazi area.[36] It is suggestive of some of the bulbous-legged vessels from the Mexican area, although here the lobes are actually body segments rather than legs. In this the form is more like that of some of the jars found in the Hohokam area and in Arkansas,[37] but it is not as highly developed. The shape probably owes something to Mexican influence and is generally believed to have originated in Middle America,[38] although it is more common for jars and vases than for pitchers.

Variations of the so-called gourd-type pitcher are present in the series. The Whitewater examples do not follow the vegetal model as closely as those from some localities, but they do suggest the form. The bodies as a rule are globular or globular with slightly depressed tops. The neck portions are continued and bent downward to make hollow handles for the vessels. It is in the latter feature that they simulate the gourd or squash. The example *c*, plate 10, is much like some of the other types of pitchers except for the handle which actually is a part of the neck. On this specimen the handle is attached to the body of the vessel at the shoulder but in many cases it is not. On both *d* and *e*, plate 10, it is free at the lower end. The complete handles are missing from both of the latter specimens, yet the sides of the vessels show that the handles were not attached. In the case of *e* the fractured end was smoothed and the pitcher continued in use after the tip was broken off. Specimen *c* is a good example of a modified Basket Maker pitcher with a decoration. The Kana-a black on white is represented by *d*, plate 10, and the Chaco I by *e*.

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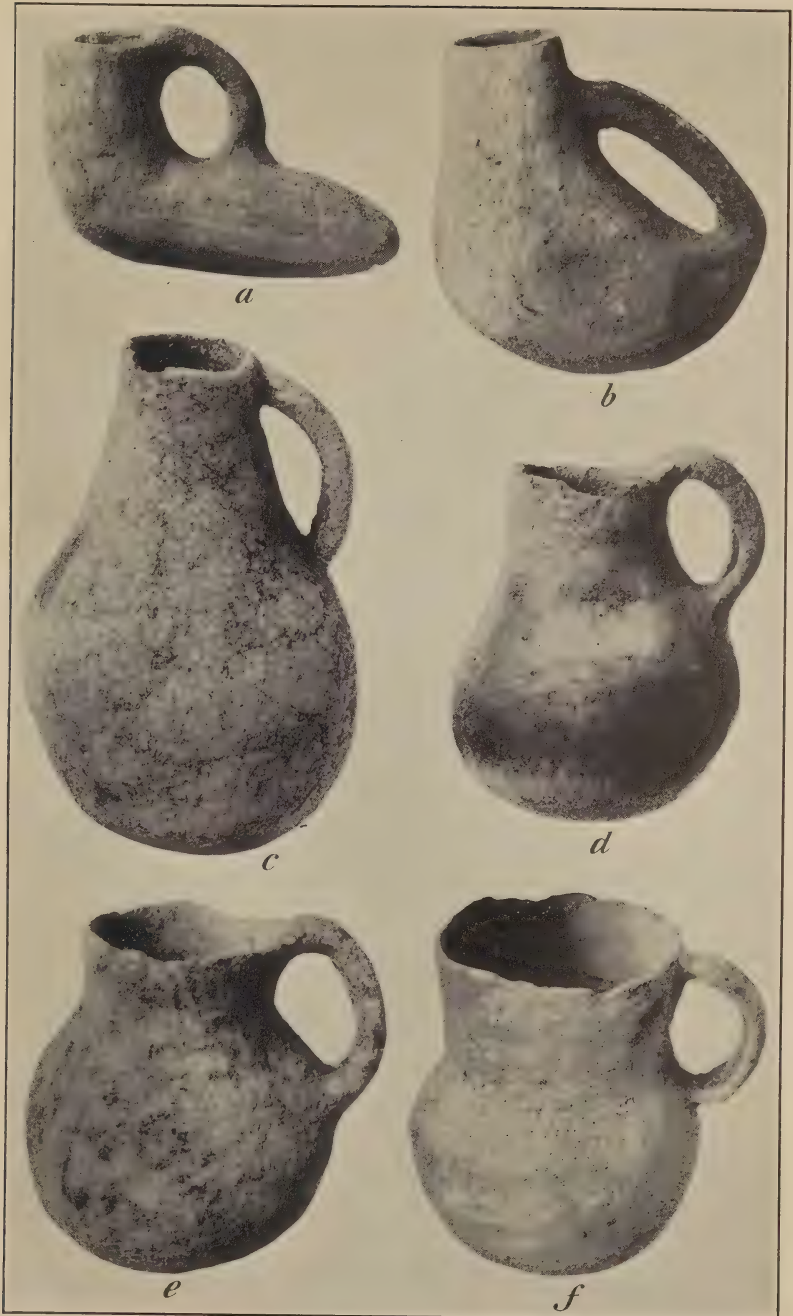
[36] A painted example, black on white, was found at Starkweather ruin in the Mogollon district (Nesbitt, 1938, pl. 31, *b*) in a later horizon than that of the Whitewater specimens.

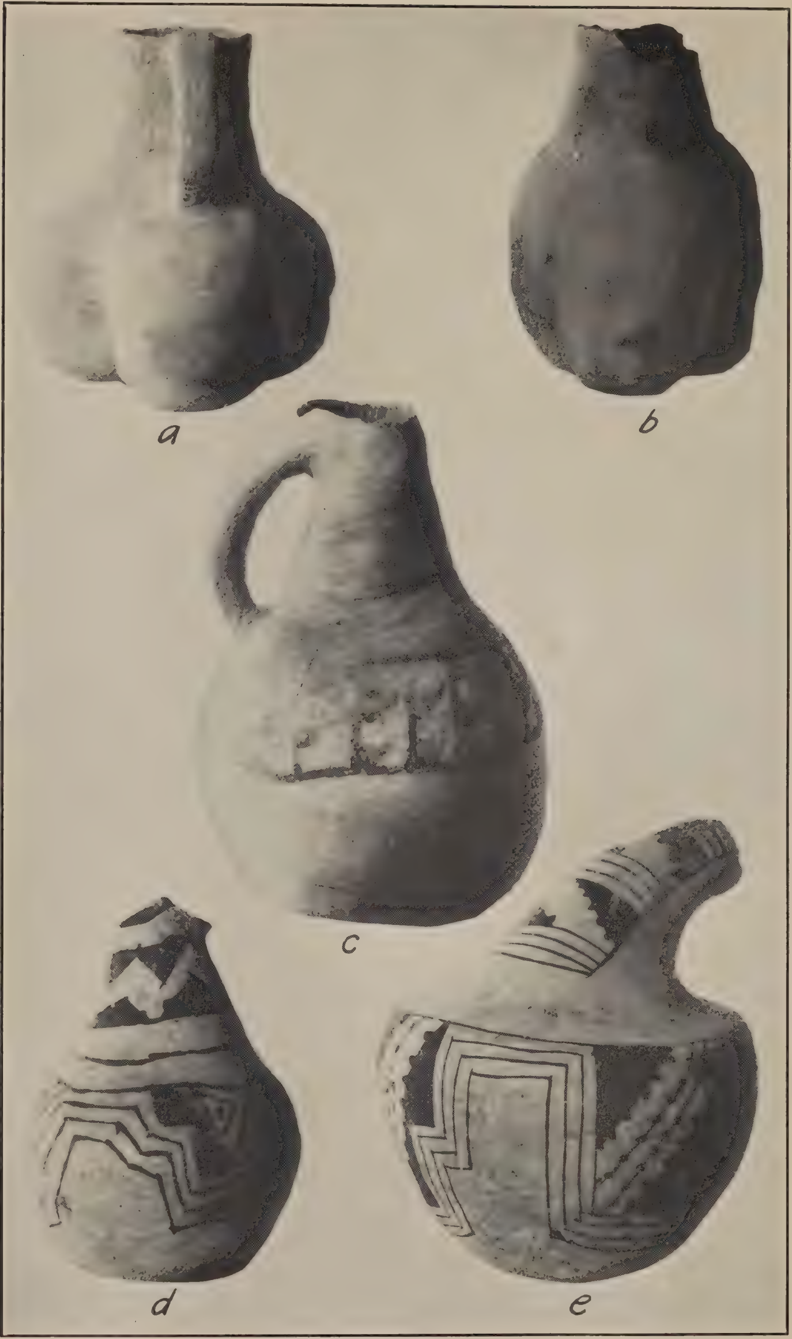
[37] Gladwin, 1930 b, pl. 11; Harrington, 1920, pl. 88 *a;* Moore, 1910, fig. 34.

[38] Vaillant, 1932, p. 13.

The common pitcher shapes were those with globular bodies, comparatively short necks with approximately vertical sides, and medium-sized orifice (pl. 12, *c*, *d*; pl. 16, *b*); globular bodies with longer necks and medium-sized orifice (pl. 12, *e*, *f*; pl. 16, *a*, *e*); globular bodies with medium-length necks and large orifice (pl. 15, *d*); globular bodies with tapering necks and wide orifice (pl. 15, *b*, *e*); globular bodies with a depressed top forming a definite shoulder at the base of the neck and a cylindrical neck with medium-sized orifice (pl. 15, *c*; pl. 16, *c*, *f*). Shapes not so prevalent, although occurring in sufficient numbers to indicate that they belong in the complex, are the squat bodies with depressed top forming a shoulder and long cylindrical neck (pl. 16, *d*); bird-shaped (pl. 14, *e*; pl. 15, *a*); ring-bottomed bodies (pl. 14, *g*, *h*); and the slipper or moccasin type sometimes considered a modification of the bird shapes (pl. 14, *f*). Most of these shapes are present at sites of comparable horizon in the Anasazi province. The surface treatment and style of decoration on these vessels show some differences. Suffice it to say that there are Chaco, Kayenta, Little Colorado, and Tularosa examples with the Chaco predominating. In all cases the surfaces were scraped and smoothed, generally treated with a polishing stone, and a majority were given a slip before the design was applied. Some do not have it, however, particularly those of the Modified Basket Maker series and some in what is here considered the Little Colorado group. The slips show the same characteristic on the pitchers that they did on the large jars and the same is true for the paste. Handles are of the loop, round to oval cross section, flat band, concave band, and on a few examples the effigy type. The latter are zoomorphic in character and are generally considered as typical of Tularosa ceramics. As on the other types of pitchers previously described, the handles start from the extreme margin of the rim, on a line with the lip, and from the side of the neck below the rim, and

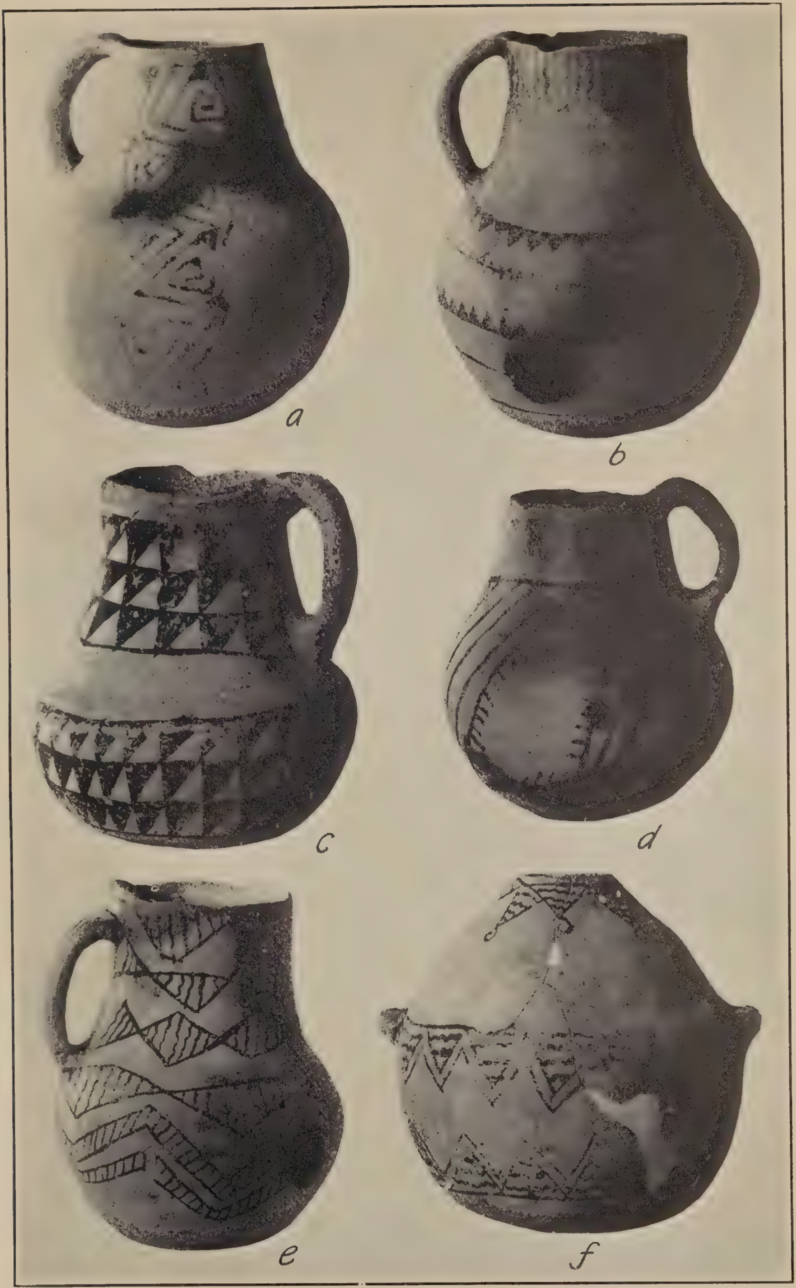


MINIATURE VESSELS FROM MODIFIED BASKET MAKER AND BEGINNING DEVELOPMENTAL PUEBLO HORIZONS.



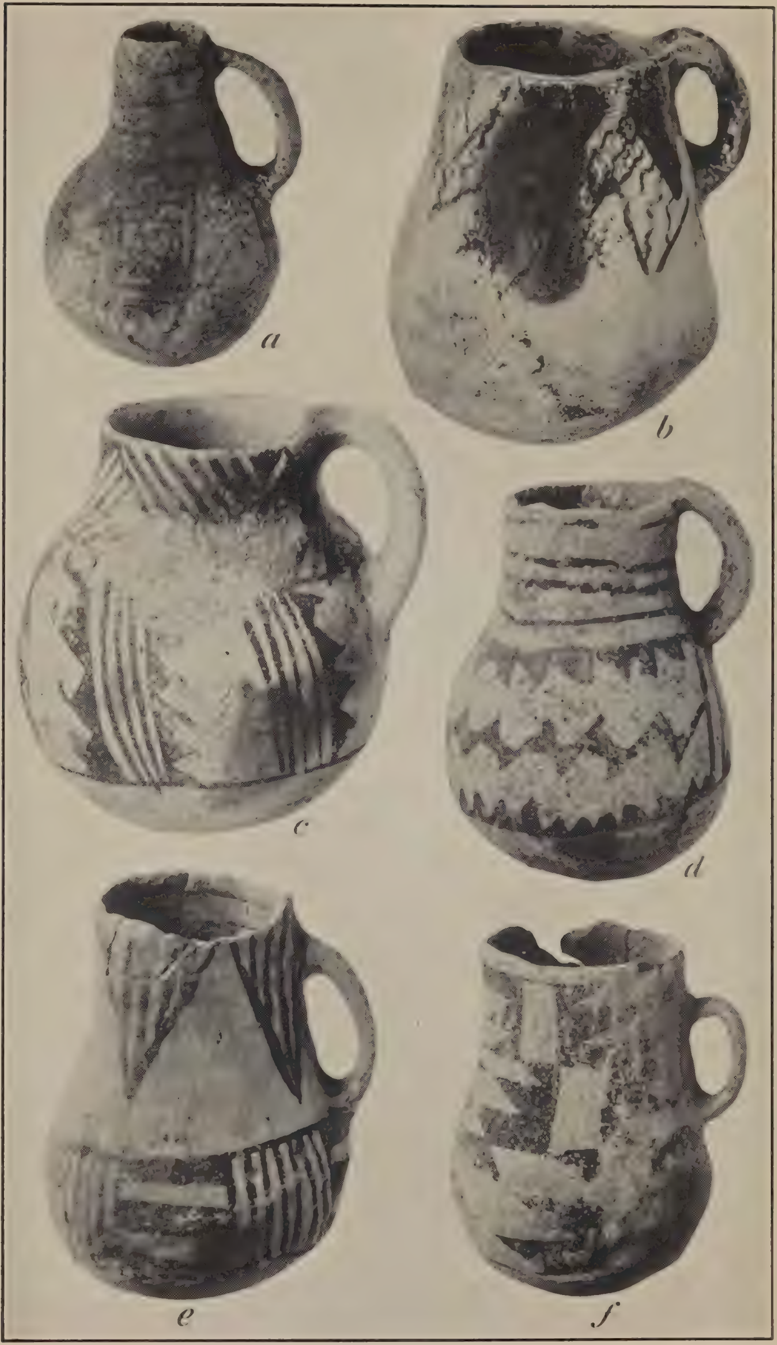
NONCULINARY PITCHERS.

a and *b* are trilobed body type; *c*, *d*, and *e*, variations of gourd-shape vessels.



PITCHERS AND CANTEEN FROM THE PAINTED WARES.

These are examples of the Little Colorado series.



Various Forms of Black-on-White Pitchers.

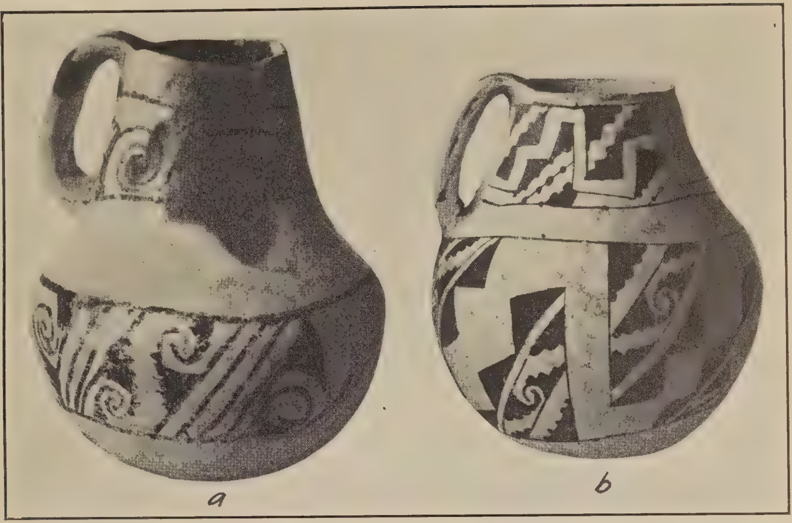
extend to the body in the approximate region of the shoulder. On some examples, as in the case of those with the long necks, the attachment of the lower end of the handle is on the neck. The welding and riveting processes seem to have prevailed in fastening the handle to the body.

There is a rather wide size range in some of the groups, while others do not show any marked variation. The gourd-type pitchers are from 4⅜ to 7½ inches (11.11 to 19.05 cm.) in height, 3¼ to 5½ inches (8.25 to 13.97 cm.) in diameter, and the orifice diameters are from 1 to 2 inches (2.54 to 5.08 cm.). Wall thicknesses are from 3/16 to ¼ of an inch (4.7 to 6.3 mm.). The three-lobed pitchers have heights from 3½ to 4¾ inches (8.89 to 12.06 cm.), and maximum diameters from 3¼ to 3¾ inches (8.25 to 9.52 cm.); diameters of the individual lobes range from 1¾ to 2 inches (4.44 to 5.08 cm.). Orifice diameters are from 1¼ to 1½ inches (3.17 to 3.81 cm.). Wall thicknesses are from 3/16 to 9/32 of an inch (4.7 to 7.1 mm.). The globular-bodied forms with short necks have heights from 4 5/16 to 6 inches (10.95 to 15.24 cm.), diameters from 3¼ to 5½ inches (8.25 to 13.97 cm.), and orifice diameters from 1½ to 2½ inches (3.81 to 6.35 cm.). Wall thicknesses are from 3/16 to ¼ of an inch (4.7 to 6.3 mm.). The globular-bodied vessels with medium-length necks have heights from 4¾ to 8½ inches (12.06 to 21.59 cm.), diameters from 3⅞ to 6⅜ inches (9.84 to 16.19 cm.), and orifice diameters from 2⅜ to 4 inches (6.03 to 10.16 cm.). Vessel walls range from 3/16 to 5/16 of an inch (4.7 to 7.9 mm.) in thickness. The globular-bodied forms with medium-length necks and wide orifices, in proportion to vessel size, have heights from 6 3/16 to 7 11/16 inches (15.71 to 19.5 cm.), diameters from 4⅝ to 5⅝ inches (11.74 to 14.28 cm.), orifice diameters from 2 15/16 to 3¼ inches (7.46 to 8.25 cm.). Wall thicknesses are from 7/32 to 11/32 of an inch (5.5 to 8.7 mm.). Pitchers with the globular body and tapering neck with wide orifice range from 7⅛ to 8⅝ inches (18.09 to 21.90 cm.) in height, from 6 to 8⅜ inches (15.24 to 21.27 cm.) in diameter, and the orifice diameter from 3¼ to 4¼ inches (8.25 to 10.79 cm.). Wall thicknesses range from 7/32 to 23/64 of an inch (5.5 to 9.1 mm.). Pitchers in the globular body with shoulder and cylindrical neck group have a height range between 7¼ and 8½ inches (18.41 and 21.59 cm.), diameters from 5¾ to 6⅜ inches (14.60 to 16.19 cm.), and orifice diameters 3 5/32 to 4 inches (7.95 to 10.16 cm.). The wall thicknesses are 13/64 to ⅜ of an inch (5.1 to 9.5 mm.). The pitchers with long cylindrical necks and squat bodies have a height range from 9 to 10 inches (22.86 to 25.40 cm.), body diameters from 5¼ to 6 inches (13.33 to 15.24 cm.), neck diameters from 3⅞ to 5 inches (9.84 to 12.7 cm.). Wall thicknesses range between ¼ and 11/32 of an inch (6.3 and 8.7 mm.). The bird-shape pitchers have a height range from 4⅝ to 8¾ inches (11.74

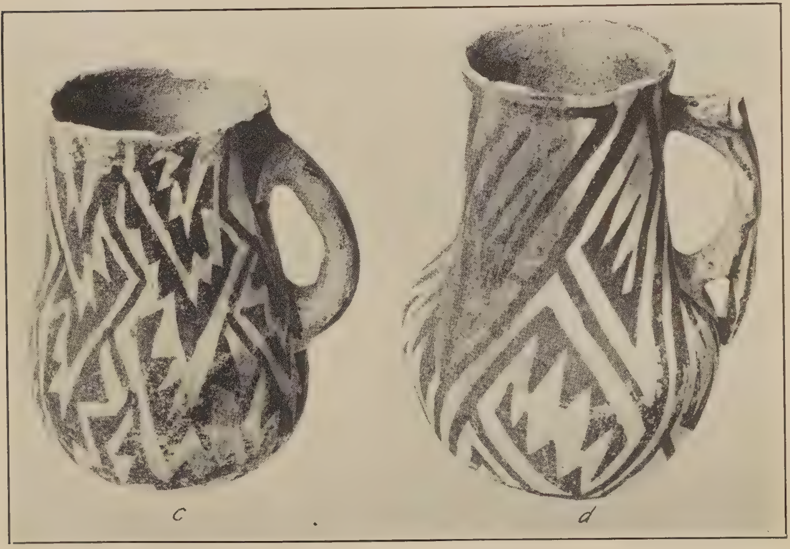
to 22.22 cm.), a body length from 5¾ to 10⅜ inches (14.60 to 26.35 cm.), body width from 4⅞ to 7½ inches (12.38 to 19.05 cm.), and orific diameters from 2¾ to 5¾ inches (6.98 to 14.60 cm.) Wall thicknesses range between ¼ and ⅜ of an inch (6.35 and 9.52 mm.). Ring-bottomed pitchers have heights from 2⅜ to 4 inches (6.03 to 10.16 cm.), maximum diameters from 2¾ to 4 inches (6.98 to 10.16 cm.). Orifice diameters are from 1 to 1½ inches (2.54 to 3.81 cm.). Wall thicknesses are from $\frac{3}{16}$ to ¼ inch (4.7 to 6.3 mm.). The slipper or moccasin forms range between 4¼ and 5 inches (10.79 and 12.7 cm.) in height, 5⅛ and 6 inches (13.01 and 15.24 cm.) in length, 2½ and 3⅜ inches (6.35 and 8.57 cm.) in width, and have orifice diameters from 1¾ to 2¼ inches (4.44 to 5.71 cm.). Wall thicknesses are between $\frac{3}{16}$ and ¼ of an inch (4.7 and 6.3 mm.).

The canteens or small-mouthed jars do not have a great variety of shapes. There are two main forms; one consists of those exhibiting modifications of a pear shape (pl. 11, *f;* pl. 17, *a*, *b;* figs. 20, 25) and the other the group with globular bodies and slightly depressed tops (pl. 17, *c*, *d*, *f*). Most of the pear-shaped vessels have direct orifices, although a few have a low rim bordering the opening as in the case of the one illustrated in figure 20. The other group is characterized by short cylindrical necks. The pear-shaped type is the older form. As in the case of the large jars and the pitchers, the surfaces of the canteens were scraped and smoothed, and frequently polished. Most of the vessels have a slip, although a few of the earlier ones were not given the wash of "liquid" clay before the decoration was applied. This is especially true for those belonging to the Little Colorado group. Paste qualities are similar to the corresponding wares in the jars and pitchers. Handles are either of the simple lug variety with a vertical perforation, possibly provision for suspension with a cord, as on *f*, plate 11, and *c*, plate 17; or of the single, short-loop type such as illustrated by *a*, *b*, *d*, and *f*, plate 17. The lug forms as a rule were simply welded to the side of the vessel when the clay was moist, but an occasional example indicates that the riveting process was used. The loop types all appear to have been attached by the riveting process.

The size variation in the canteens is not great. Fragments from vessels of this type when compared with the whole specimens show little deviation from the sizes represented. The pear-shaped group in the collection have heights from 4½ to $7\frac{1}{32}$ inches (11.43 to 17.83 cm.), diameters from $4\frac{5}{32}$ to 7 inches (10.56 to 17.78 cm.), orifice diameters from $\frac{51}{64}$ of an inch (2.02 cm.) to 1¾ inches (4.44 cm.). The wall thicknesses are from $\frac{3}{16}$ to $\frac{9}{32}$ of an inch (4.7 to 7.1 mm.). In the second group the heights range from 3¾ to 4⅞ inches (9.52 to 12.38 cm.), diameters from 4⅛ to 4⅞ inches (10.47 to 12.38 cm.), and

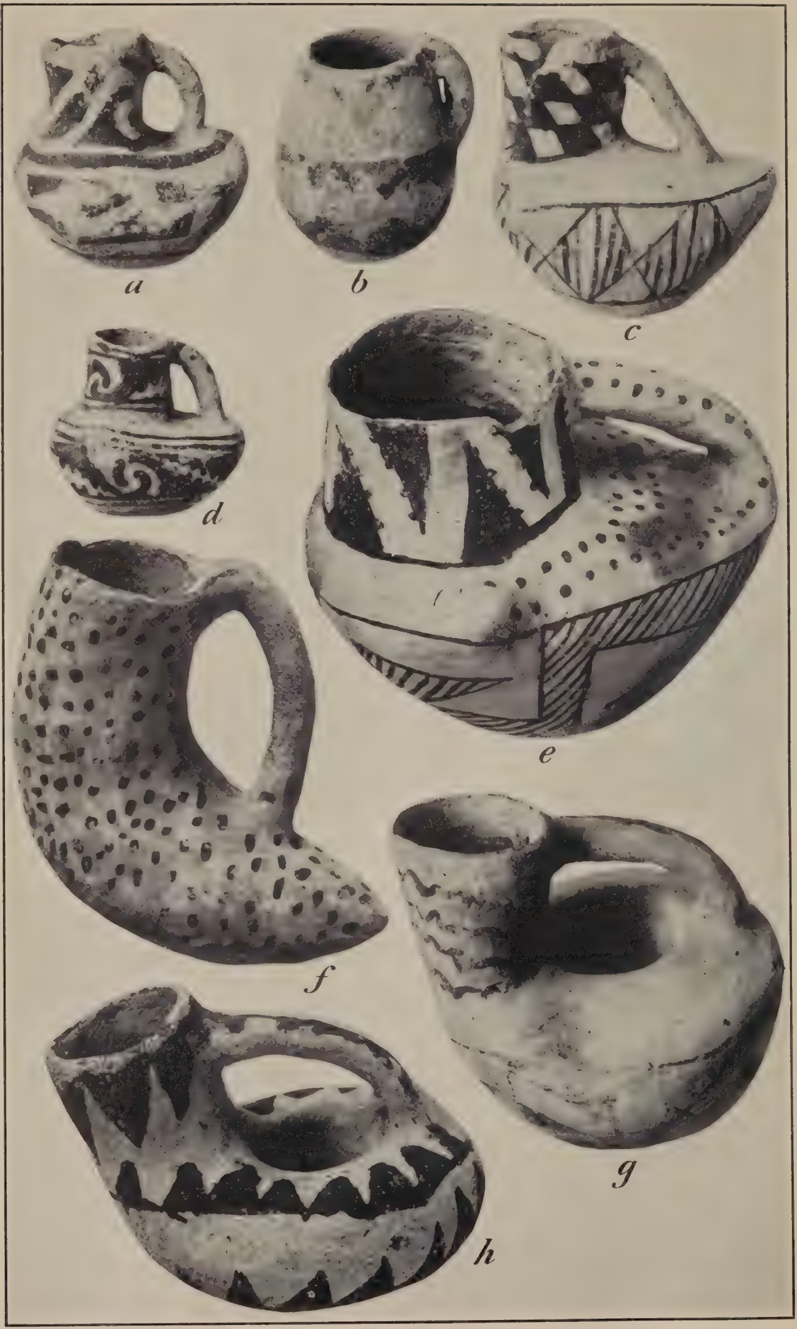


a b, Middle phase of Developmental Pueblo.

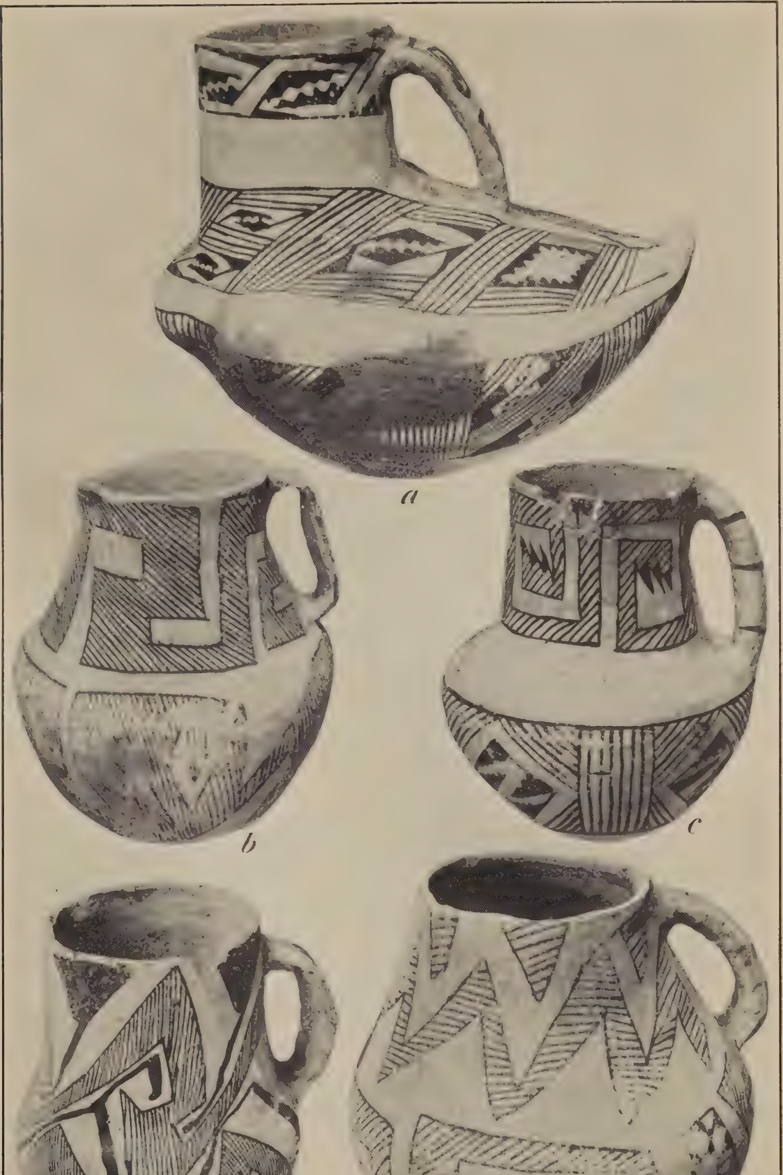


c, *d*, Closing stage of same period.

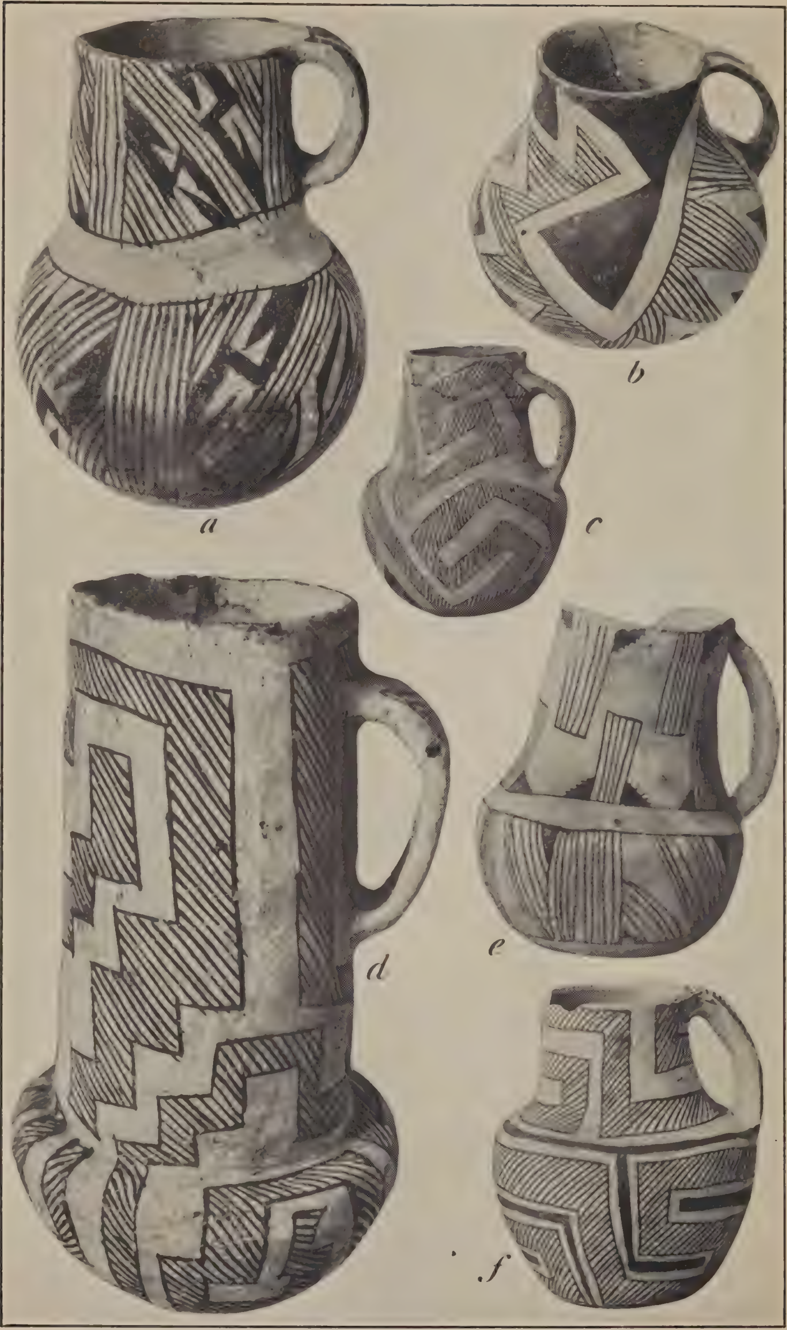
BLACK-ON-WHITE WARE PITCHERS.



BIRD-SHAPED AND RING-BOTTOMED PITCHERS.



BLACK-ON-WHITE WARE PITCHERS.



Late Developmental and Early Great Pueblo Black-on-White Pitchers.

orifice diameters from 33/64 of an inch (1.30 cm.) to 1 3/16 inches (3.01 cm.). The wall thicknesses are the same as for the other series.

Seed jars or seed bowls, as they are sometimes called, occur in two shapes. The prevailing form was a globular body with a flat top and medium-sized orifice (pl. 17, *e*; fig. 32). The other form had a globular body with only slightly depressed top and medium-sized orifice (fig. 31). For some reason this type of vessel does not appear to have been made in very large numbers. In the Chaco canyon and more northern parts of the Anasazi province the seed jars constitute a large percentage in the vessel forms, but here, at the Village of the Great Kivas on the Zuñi Reservation,[39] and at the Long H. Ranch[40] they were not numerous. What significance, if any, this condition implies is not quite clear. The form was not rare in later horizons at other sites in this region and farther west. Perhaps it had its greatest development in the northern parts of the province and the spread to this district was slow. All of the examples found here belong to the Developmental period, there are none from the Modified Basket Maker horizon. The surfaces of these vessels were scraped and smoothed and polished in varying degrees. On some there is a good polish, on others only a suggestion of the use of the stone. The texture of the paste and its other qualities corresponds to the other groups. Some of the seed jars have small nubbin handles with vertical perforations, but most of them are without the feature.

The seed jars with globular bodies and flattened tops were rather small as a group. There are no specimens approaching the large sizes found in other districts and none of the potsherds from this type vessel indicated much deviation from the range in the collection. Heights are from 2½ to 3¼ inches (6.35 to 8.25 cm.), body diameters from 3¾ to 5⅝ inches (9.52 to 14.28 cm.), orifice diameters from 1¾ to 2½ inches (4.44 to 6.35 cm.). The globular-bodied vessels with slightly depressed top are somewhat larger. They range from 4 to 6 inches (10.16 to 15.24 cm.) in height, from 6⅛ to 8 inches (15.55 to 20.32 cm.) in diameter, with orifice diameters from 2¾ to 3½ inches (6.98 to 8.89 cm.). Wall thicknesses in both groups fall within the same range, 3/16 to 5/16 of an inch (4.7 to 7.9 mm.).

The scoops and ladles in the Whitewater series show some interesting forms. The scoops are of the type where the handle is merely a prolongation of one side of the bowl, a form sometimes called the half-gourd ladle because they are so similar to the well-known dippers made by bisecting such vegetal objects lengthwise. There are several variations in the shapes in this group. The simplest one has an ovoid contour with a broad, shallow handle and no indication of a break or differentiation between the bowl and handle portions beyond a slight indentation of the rim (pl. 18, *a*). The second shape was derived from the first and is characterized by a definite delimitation of a bowl through building up the wall for several rows of bands before fashioning the handle. This shape is sometimes called the cap-type scoop because it resembles that article of apparel when held in an inverted position (pl. 18, *b*). The third form is more nearly like that of a half gourd. The handle is still a prolongation of one side, but it forms a slight angle with the bowl and the latter in its lower portion is distinct from the handle (pl. 18, *c*). Ladles are all of the bowl and handle type. One form suggests a development from the scoop type in that the concave handle is a prolongation of the bowl, although it is separated from it by a partition that actually completes the bowl (pl. 19, *a*). Other forms have solid handles attached to the bowl. Some, as on *b*, plate 19, are flat with a slight concavity on the upper side and join the side of the bowl below the rim. Others are roughly rectangular or oval in cross section and are attached to the bowl at the edge of the rim (pl. 19, *c*). Both scoops and ladles were made during the Modified Basket Maker and Developmental Pueblo periods and the vessels exhibit the same characteristics of paste texture and quality as the other containers of the periods. The earlier forms did not have a slip and in many cases were not decorated. The later examples were given a slip and some form of design was painted in the bowl and on the handle. The simple form of scoop appears to have been the first made, but the handled types were not long subsequent. At the end of the Developmental period ladle handles were of the hollow, tubular variety. This form persisted in the Great Pueblo horizon. No whole specimens of this style ladle are in the collection, although its presence is demonstrated by handle fragments and by portions of bowls with pieces of handle on them.

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[39] Roberts, 1932, p. 108.

[40] Roberts, 1931 b, p. 125.

The simple ovoid-shaped scoops range from 1⅝ to 2½ inches (4.12 to 6.35 cm.) for bowl height and from 3⁵⁄₁₆ to 4¼ inches (8.41 to 10.79 cm.) for bowl diameter and from 4⅞ to 5½ inches (12.38 to 13.97 cm.) for total length. Thickness is from ³⁄₁₆ to ¼ of an inch (4.7 to 6.3 mm.). The cap-type scoops have a bowl height from 1⅞ to 3 inches (4.76 to 7.62 cm.), bowl diameters from 3¾ to 5¼ inches (9.52 to 13.33 cm.), and total lengths from 4⅞ to 6½ inches (12.38 to 16.51 cm.). Wall thicknesses are within the same range as for the first type. The third scoop shape ranges from 1¼ to 2¼ inches (3.17 to 5.71 cm.) in bowl height, from 2 to 5⅛ inches (5.08 to 13.01 cm.) for bowl diameters, and from 4⅜ to 8¾ inches (11.11 to 22.22 cm.) for total length. Wall thicknesses range from ⅛ to ⅜ of an inch

(3.17 to 9.52 mm.). Ladles with the scoop-type handle such as *a*, plate 19, have bowl heights from 15/16 of an inch (2.38 cm.) to 1¾ inches (4.44 cm.), bowl diameters from 2 to 2½ inches (5.08 to 6.35 cm.), and total lengths from 41/16 to 6½ inches (10.31 to 16.51 cm.). Wall thicknesses from 3/16 to 11/32 of an inch (4.76 to 8.73 mm.). The bowl and solid-handle ladles have bowl heights ranging from 17/16 to 2 inches (3.65 to 5.08 cm.), bowl diameters from 2⅞ to 5¾ inches (7.30 to 14.60 cm.), and total lengths from 61/16 to 9½ inches (15.39 to 24.13 cm.). Wall thicknesses are from 3/16 to ⅜ of an inch (4.76 to 9.52 mm.), handle widths from ¾ of an inch (1.90 cm.), to 1½ inches (3.81 cm.), and handle thicknesses from ¼ to ½ of an inch (6.35 to 12.7 mm.).

There are two types of bowl shapes in the collection. One is the form generally called deep, the other is the shallow. The deep bowls are those in which the height is greater than half the diameter. In the shallow group the height is less than half the diameter. The latter class predominated throughout in the Whitewater District. Some of the deep bowls had full-rounded bottoms and sides that were almost vertical for some distance below the rim (pl. 20, *a*). Others had somewhat more sharply-rounded bottoms and curved sides with the beginning of a slight incurve to the wall just below the rim (pl. 20, *b*). There is some doubt that the latter were local products. Certain features suggest that they may have been trade pieces brought into the district from farther west. Practically all of the shallow bowls had sharply-curved bottoms and walls that followed a regular curve to the rim (pl. 21). Rims in all cases were direct, rarely flattened on the lip, and for the most part were undulating and uneven around the periphery. The interior surfaces of the vessels were scraped and smoothed, often polished, and the exteriors were smooth, banded, or corrugated. Smoothed exteriors (pl. 20, *a*, *b;* pl. 21, *b*) predominated, but banded forms (pl. 21, *c*) were not rare. And banded surfaces with tooled grooves between the bands and pinched-in designs (pl. 22, *c*) were made from time to time. Occasional specimens exhibit an allover indented-corrugated exterior (pl. 21, *a*). Modified Basket Maker bowls have no slip and some of the early Developmental Pueblo vessels also lack the feature, but its use became general soon after the beginning of the latter stage. All interiors were so treated and in most cases the wash of "liquid" clay was applied to the exterior. Sporadic examples occur throughout the series, however, with no outside slip.

The bowl (pl. 20, *a*) is a typical Modified Basket Maker specimen. It exhibits the eastern characteristics of an iron pigment, light-colored pulverized rock particles used in tempering, and an interior that is much smoother than the exterior. It represents the wares belonging to the closing days of the period and unquestionably is related to those found in the Chaco district and regions farther north. Bowls *b* and *c*, plate 21, are early Developmental Pueblo. The Chaco I type is well illustrated by *b* which also is like the majority of the wares from the pit houses at the Long H Ranch,[41] that have been designated as Kiatuthlanna black on white.[42] The banded example is more in line with the Little Colorado form of the early Developmental, although its counterparts may be seen in collections from the Chaco Canyon and along the Puerco River east from the Whitewater District. The paint in the decoration is an iron mixture and corresponds to the group in that respect. An interesting feature of the banding is that the point of juncture for each band is plainly visible and the loops of clay made but a single circuit of the periphery. They were true bands, not coils. The bowl with the tooled bands and indented pattern (pl. 22, *c*) is a late Developmental form. The indented-corrugated example (pl. 21, *a*) is Great Pueblo and the smoothed exterior with painted decoration (pl. 20, *b*) is from the same horizon. The latter vessel does not seem to be a local product, however, and probably came from one of the centers farther west.[43]

Burnished-black interior bowls and redware bowls tend to the shallow type. Some approached the deep form with heights approximately the same as half the diameter; this is particularly true for those with the gray exterior and burnished-black interior, but most of them belong unquestionably to the shallow category. The surfaces on these vessels were scraped and smoothed and generally polished. Some indicate that they were polished before the slip was applied and afterward as well, producing a very smooth and shiny surface. A few fragments from burnished-black interior, corrugated-red exterior bowls and black-on-red interior corrugated-exterior bowls were found on the Great Pueblo refuse mounds but there are no whole vessels in the collection on which to judge the shape type. Most of the black-on-red fragments indicate the type of pottery characteristic of early Developmental Pueblo ceramics. The general color tone is a light red and the pigment in the decoration has a brownish cast and a semitransparent quality that is typical. This same type of red-with-black decoration occurs in the Chaco Canyon and as far northeast as the Piedra District in southwestern Colorado.[44] The form is also found at sites in southeastern Utah where

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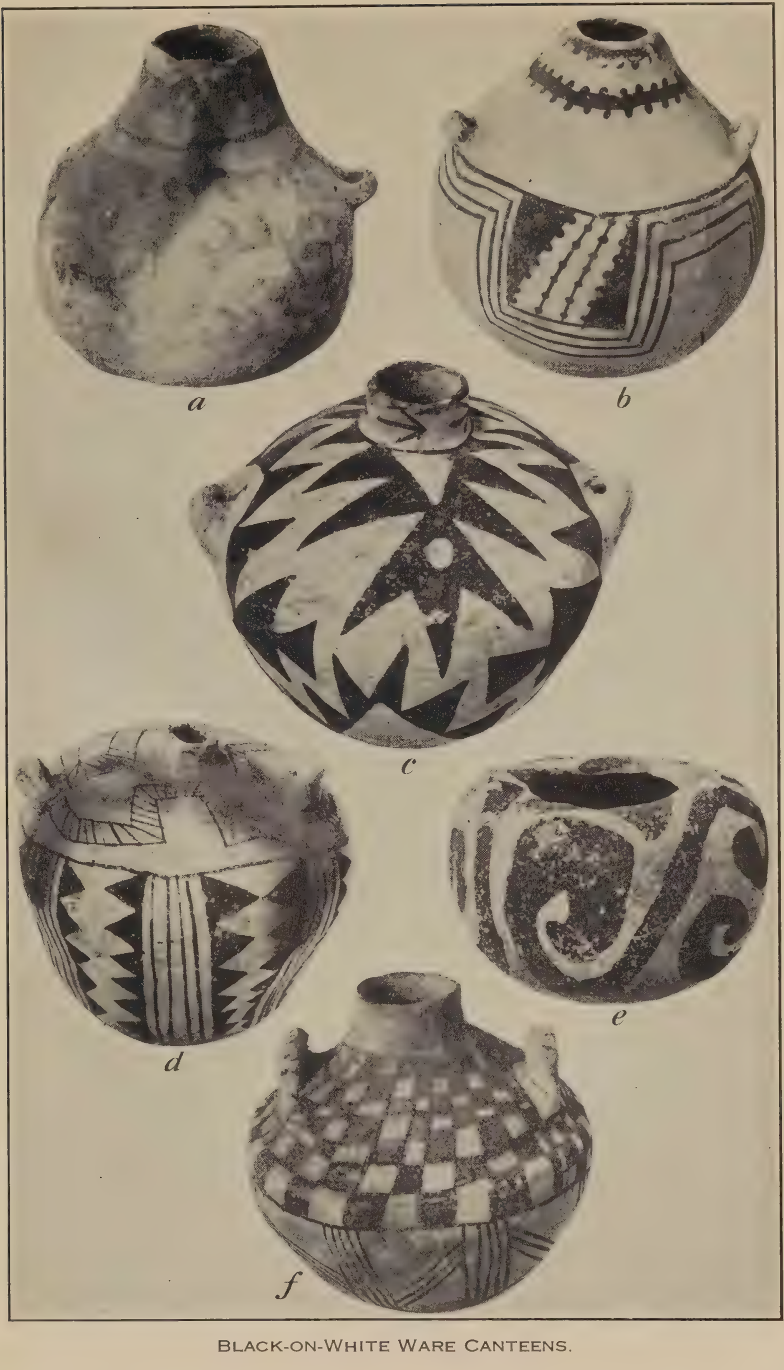
[41] Roberts, 1931 b, pl. 17 *e*, pls. 19, 21.

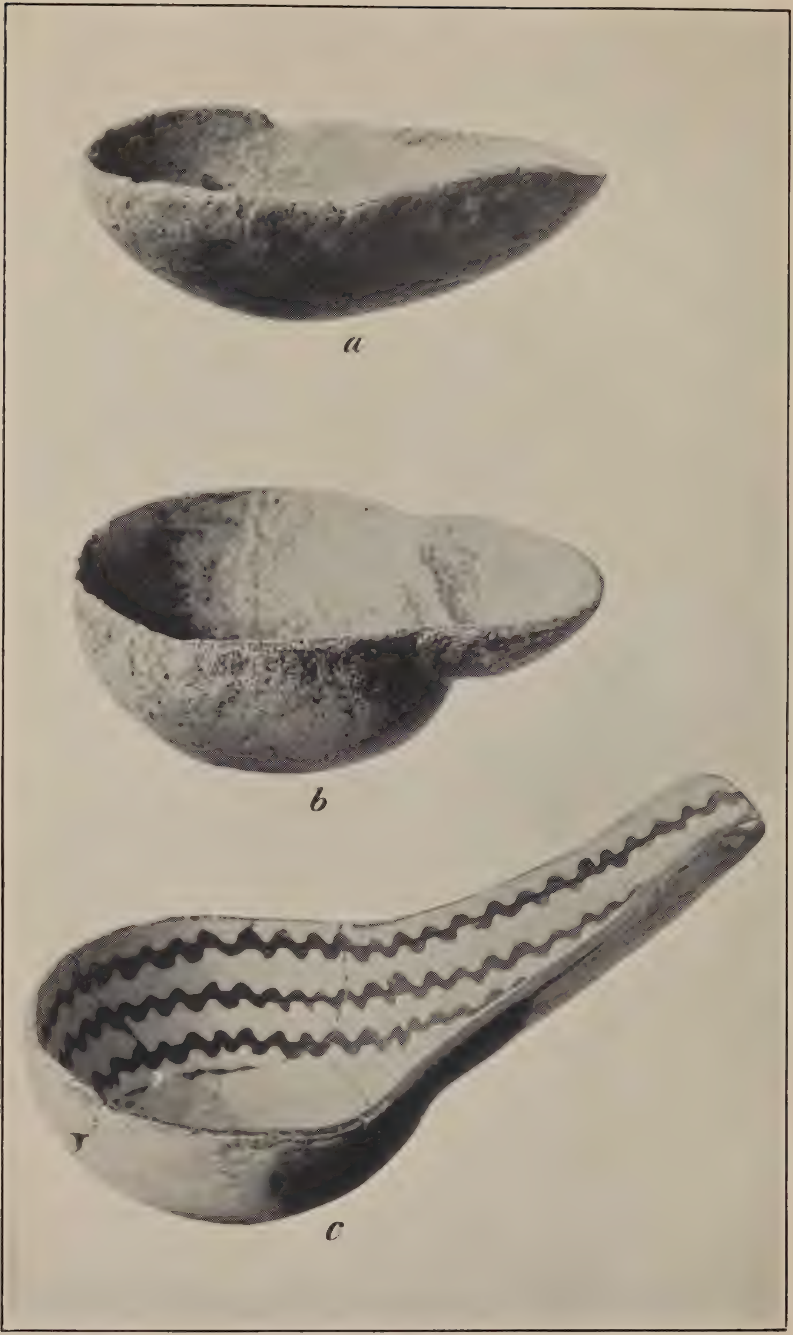
[42] Gladwin, 1934, figs. 3, 4.

[43] This may be an example of the so-called Holbrook black on white (Mera, 1934, pp. 9–10) or some related variant of the so-called Deadman's black on white (Hargrave-Colton, 1932, pp. 15–16).

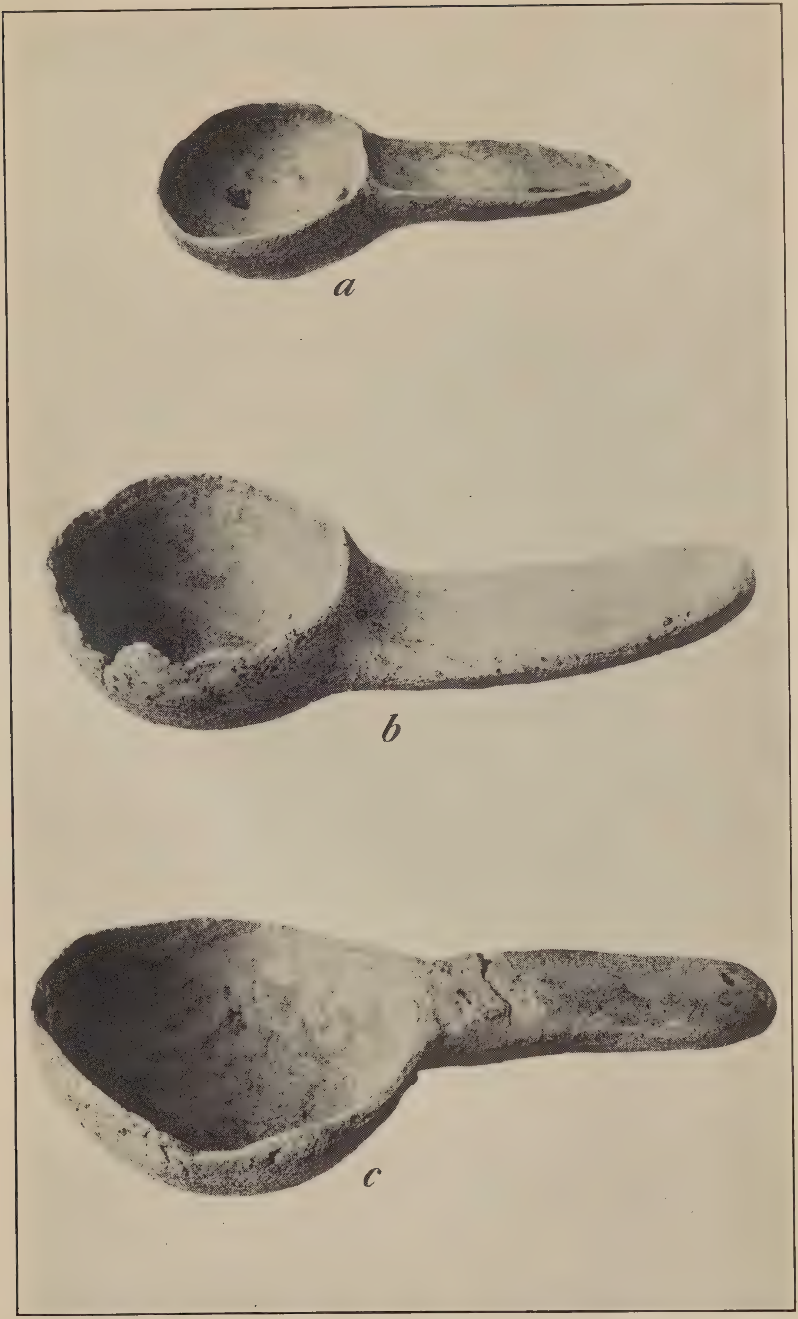
[44] Roberts, 1930, pp. 138–139.



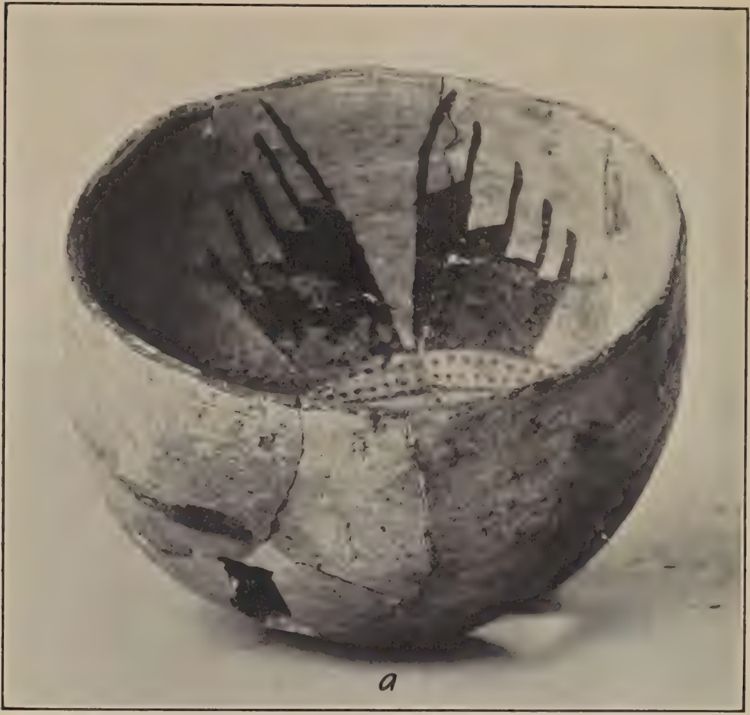
Black-on-White Ware Canteens.



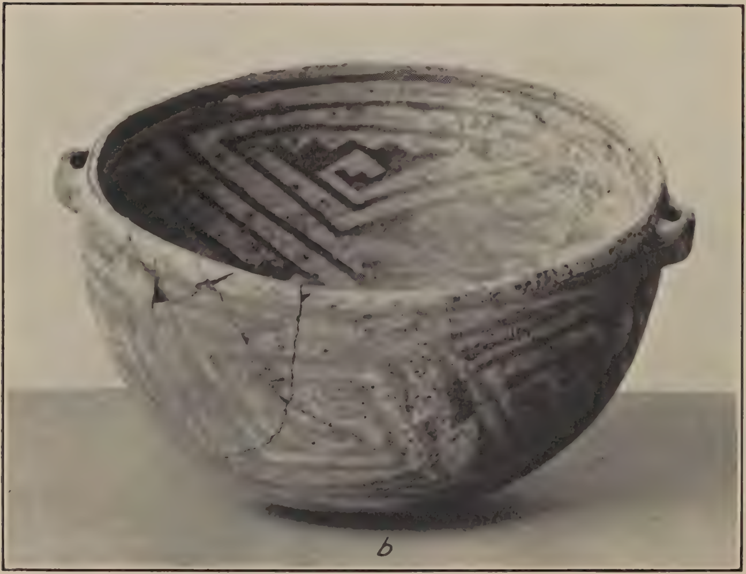
SCOOP TYPES.



Ladle Forms.



a, Modified Basket Maker bowl.



b, Great Pueblo bowl.

DEEP BOWLS.

the percentage of black on red is so much greater than that for other forms that the type seems likely to be a diffusion from that region.[45] Later examples of the red-with-black decoration belong to several different groups. One is characterized by a light-reddish color and decorations composed of heavy line, rectangular fret figures, a style of design frequently found on vessels of the black-on-white wares. This form occurs at sites along the Puerco and is quite prevalent in the Chaco Canyon. The decorations are suggestive of those on the so-called Showlow black on red,[46] but the other characteristics differ too much to consider the Whitewater examples an affinity of the type. Another ware corresponds in general to that called Puerco black on red,[47] although there seems to be some confusion over what the characteristics of this pottery actually are. A third form is that of the Wingate black on red.[48] The few sherds from indented-corrugated exterior and decorated-interior red bowls seem to be of the type called Wingate corrugated.[49]

The paste texture, qualities of fracture, material used in tempering, surface finish and general treatment of the bowls in the black-on-white group correspond to similar characteristics in the other vessel forms belonging to the different series represented. The paste in the Modified Basket Maker bowls was medium in texture although tending to be somewhat finer than that in the large jars and pitchers. White sand or pulverized light-colored rock was used in the tempering and particles of the material project from the surfaces to produce the characteristic stippled appearance. Color is gray to white, almost a chalk white in a few examples. Breakage is a rough and crumbling fracture. Surfaces scraped and smoothed but not actually polished. No slip, yet the interior surfaces were sometimes smoothed to the extent that fine particles were brought to the surface as a float and suggest a thin slip. Decoration applied with iron paint that fired from a reddish brown to a brownish black and occasionally a good black tone.[50] The exterior on some bowls was given a wash of "fugitive red." More may have been treated in this fashion and the pigment may have disappeared as the result of weathering. No examples of the western form, Lino black on gray,[51] are present in the collection although it is not improbable that sporadic sherds of the type will be found in the district.

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[45] This ware is possibly a variant of the type called Deadman's black on red (Colton, 1932, p. 11; Hargrave-Colton, 1932, p. 18; Colton-Hargrave, 1937, pp. 71–72). It is similar to, but not wholly identical with potsherds designated Pueblo I and illustrated by Guernsey, 1931, pl. 61.

[46] Haury, *in* Gladwin, 1931, pp. 27–28, pl. 31, lower.

[47] Hawley, 1936, p. 47, described but not named in Hawley, 1934, pp. 43–44; name without description in Gladwin, 1934, fig. 4. The form is redescribed in Colton-Hargrave, 1937, pp. 120–121, but the accompanying sherd illustrating the type does not answer Hawley's description. It is more like the first unnamed form mentioned above.

[48] Gladwin, 1931, pp. 29–31.

[49] Mera, 1934, p. 11.

[50] This type is the eastern form of Modified Basket Maker, sometimes called La Plata black on white (Hawley, 1936, p. 23).

The Chaco I bowls have a medium paste texture. The potters used pulverized light-colored stone, presumably quartz, and ground potsherds for the necessary aplastic in tempering the clay. Color ranges from a light gray to a good white with an occasional dark streak in the core. Fractures are somewhat sharper than in the case of the Modified Basket Maker vessels but have some tendency to crumble. Surfaces are scraped and smoothed with some indications of polish on the interior; exteriors tend to be rough. Slip was applied to both interior and exterior on most vessels, although it was omitted in a number of cases. Slip quality is irregular with thick and thin spots. The designs were painted on with an iron paint that ranges from brownish black to black. Some of the specimens in this group bear considerable resemblance to some of the better Modified Basket Maker vessels and it is quite possible that a form called White Mound black on white,[52] believed by some to be a late Modified Basket Maker type occurring in this region, actually is one of the variants in the early Chaco I of the Developmental Pueblo pottery. The following form in the Chaco series, one that grew out of the Chaco I, was given the working designation of Transitional in the stratigraphic studies of the Chaco ceramics. Since then it has been called Red Mesa black on white [53] and Gallup black on white.[54] The term Transitional was used because the ware apparently bridged the gap between what were then called Pre-Pueblo and Early Pueblo types, later Pueblo I and Pueblo II. The paste texture is fine and compact and considerably harder than that of the form from which it was derived. Ground potsherds with a small showing of light-colored particles, probably pulverized rock that may have been in the sherds employed for the purpose, were used in tempering the clay. Breakage occurs along well defined lines and the edges of the fracture are straight and sharp. The color ranges from a medium gray to a good white with some examples exhibiting a gray streak in the core. Surfaces were scraped, smoothed and polished. An unusually thick slip was applied and given such a high polish that it attained an enamellike quality which is readily recognized. The slip varies in color. On some specimens it is a flat white suggestive of an ivory finish, on others a thin white that apparently is a lighter form of the first. Some bowls have a cream or warm white tone, almost pinkish in cast, and others are a gray white. The latter probably is attributable to insufficient whiting in the mixture. In the earlier forms of this thick slip there was a slight tendency for it to crackle. The slip was generally applied to both the interior and exterior surfaces of bowls, but an occasional example is found where it was omitted from the exterior. The designs were painted with a thick iron pigment that is predominantly a good black, although in places it may range from a brownish black to a brownish red.

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[51] Hargrave, 1932, p. 12.

[52] Hawley, 1936, p. 23; Haury, 1936 a, fig. 6, No. 2.

[53] Gladwin, 1934, p. 20, No. 35, fig. 4, No. 35.

[54] Hawley, 1936, p. 33, pp. 42–43. There seems to be an error in identification in this instance because the description given for Gallup black on white does not fit the Transitional form but applies to other Chaco types. Also the horizon given is much later.

The transitional ware, which seems to have been a rather short-lived one, was followed by a form clearly derived from it yet lacking many of its better qualities. This particular characteristic is so marked that the pottery representing the class was given the working designation of Degenerate-Transitional by the investigators studying the Chaco Canyon ceramics.[55] Why there should have been such a pronounced deterioration in the wares is not known. The occurrence in the Chaco was generally considered to be a purely local trend, but with sites located in the more distant reaches of the Chaco range of influence showing the same features, it must be attributed to some widespread motivation not yet recognized. When first noted, vessels belonging to this group were thought to be those made by poorer potters and to represent an inferior form of the Transitional or Red Mesa black on white. The stratigraphic tests, however, demonstrated that it was later in the sequence although the two occur together for a short interval and thus suggest better and poorer examples of the same ware. The paste texture is not as good; it is medium to coarse and tends to be flaky in appearance. The clay was tempered with ground potsherds and coarse particles of sand or pulverized rock, often dark in color and suggestive of a form of shale or lignite. Lines of breakage are more irregular and the edges of the fracture rough, although not crumbly. The color is generally gray with a dark core. Surfaces were scraped and smoothed, but rarely polished. The exteriors of bowls frequently show breaks and scratches and extremely coarse spots. The walls are uneven and tended to warp out of shape before being fired. The slip was applied to the interior and either omitted entirely or else restricted to a narrow band just below the rim on the exterior. Sometimes the slip was merely sloshed on the exterior or the potter wiped her hand across the bottom of the bowl leaving a smear of the "liquid clay." The slip is thin, the base color of the paste showing through on some vessels, and ranges from a dirty gray to a chalky white in character. The pigment in the designs is an iron paint and a deep black, like a lampblack, where the color is good, or a dirty rust color where not properly fired.

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[55] This type is presumably the one that is now known by the name of Escavada black on white (Hawley, 1936, pp. 32–33) and Unpolished Chaco black on white (Hawley, 1934, pp. 36–38).

All three of the forms, Chaco I, Transitional or Red Mesa, Degenerate-Transitional or Escavada, should be considered as subtypes of a single ware, one that is typically of the Chaco pattern. On all three the rims are direct and in general are pinched somewhat thinner than the vessel wall. They are either tapering or slightly rounded in cross section. Around the periphery they tend to be uneven and wavy. Handles were occasionally placed on the exterior of the bowls in this group. They were not restricted to any one particular form but appear sporadically on all three. In some cases one handle was attached to the side wall a short distance below the rim, other examples have two placed at opposite sides. The handles are of the loop variety. Some are roughly circular to oval in cross section, but the majority are of the flat-band type. They were attached by the riveting method.

Growing out of the Chaco-pattern series just described was another Chaco-influenced style of pottery in which the bowls were shallow with a tendency to flattish bottoms and only slightly curved sides. The paste texture is medium. The clay was tempered with some coarse material, but ground potsherds predominated. The paste was kneaded in a more thorough fashion than in the case of the Escavada or Degenerate-Transitional group and was somewhat more compact and slightly harder. Surfaces were scraped and smoothed, although the exteriors on some examples were not well finished, but the polishing stone was sparingly used. The slip tends to a chalky-white tone and there was some retention of the practice of merely sloshing the exterior. Most of the vessels, however, were given a good exterior slip. The pigment in the design was a combination iron and carbon paint and fired a deep black.[56] The rims are direct and the edge or lip is rounding.

Associated with the above type, and probably related to it, was one in which the bowls are shallow with slightly curved bottoms, straight to moderately curved sides and direct rims that are tapering with slightly rounded or flattish lips. The paste texture is fine, light gray to white in color with a tendency to gray streaks in the core. The clay was tempered with light-colored sand or pulverized rock, probably quartz, and ground potsherds. Less of the latter were used in this ware than in some of those that just preceded it. Breakage tends to be along straight lines with a sharp-edged fracture, although projecting particles of the material used in tempering make for rather rough surfaces. The interior and exterior surfaces were scraped and smoothed, but they were not polished until after the application of the slip. The slip ranges from a yellowish white to a chalky-gray white. The decoration was applied with an iron paint that produced a heavy, dull-black hue. This ware has a counterpart in the Chaco Canyon ceramics and at numerous sites showing a marked Chaco influence.[57]

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[56] This form seems to correspond to one of those that has been included in the group designated as Puerco black on white (Gladwin, 1931, pp. 24–26).

The Kana-a type bowls are shallow, although in most cases the shape has the same contour as in the deep style, with slightly rounded bottoms and sides that rise with a moderate curve more nearly approaching the vertical than in the case of the other forms. The paste texture is medium to medium-fine. Light-colored sand or pulverized rock, quartz in all probability, was used in tempering the clay. Paste color usually a light gray with a dark streak in the core. Breakage tends to be somewhat irregular and the edges of the fracture are crumbly. Surfaces were scraped and smoothed, but only the interior polished. The scraping marks are frequently present on the exterior. The slip is generally a gray-white color and on many examples is crackled. The decoration was applied in a carbon paint that has a black tone but has the appearance of being thin or somewhat washed out.

Associated with the Kana-a is a form of bowl that appears to be a Little Colorado variant of the type. The bowls are shallow with flattish bottoms and walls that tend to rise almost vertically. Rims are direct and uneven. The paste texture is medium to medium-fine. The clay was tempered with pulverized rock, occasionally with some white sand. Breakage tends to be irregular and the lines of the fracture crumble. Surfaces scraped and smoothed, interior slightly polished. A slip was applied in some cases and not in others; when used, it was a thin mixture with a good gray-white tone. The paste color of the vessels is so light that it does not affect the slip hue. The designs were painted on with a carbon pigment that is black, although it tends to appear thin and slightly washed out and may have a slight purple tinge in spots.[58] This ware probably bears the same relation to the Kana-a black on white that the other form of Little Colorado early Developmental Pueblo does to the Chaco I.

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[57] Probably is the same as that named Gallup black on white (Hawley, 1936, pp. 42–43), that has been erroneously identified with the Red Mesa black on white (Gladwin, 1934, p. 20, No. 35, fig. 4, No. 35), or the Transitional black on white.

[58] In some respects these vessels suggest a prototype for the so-called Deadman's black on white (Hargrave, 1932, pp. 15–16), although it is possible that it may be an early form of the Holbrook black on white (Mera, 1934, pp. 9–10). The matter of paste color is not in agreement with that given by Mera, yet seems to fit that of Colton-Hargrave, 1937, pp. 235–236.

The bowls of the Little Colorado Developmental Pueblo group belong in the shallow category. They have slightly rounded or flattish bottoms and sides that are only slightly curved, rising obliquely from the bottom. The paste texture is medium to medium-fine. The clay was tempered with sand and pulverized rock, light brown or gray in color, and some ground potsherds. The paste texture is medium and tends to be somewhat flaky in some cases. The paste color may be a light tan or a grayish white. Dark streaks in the core are rather rare. The surfaces were scraped and smoothed, the interior receiving a light polish. Scraping marks occasionally are noted on the exterior. Use of the slip was not consistent. Some interiors have it, others do not, but the polishing of the interior brought a float to the surface that suggests a slip. Breakage tends to be irregular and the edges of the fracture are crumbly. Decorations were painted on in an iron pigment that fired from a brownish black to a dull black.[59]

The bowls with blackened interiors, gray, gray-brown, brown-red, red, and white exteriors, exhibit considerable variation in structural characteristics. Those with the gray exterior have medium to medium-coarse paste that has a rather spongelike appearance. Sand was used in the tempering of the clay. It appears, under a hand glass, to be the same kind of light-colored material as that in the Modified Basket Maker and early Developmental Pueblo series. As a matter of fact, the paste is quite similar to that of the early Developmental culinary vessels. The color is a dark gray on the earlier specimens and medium to light on the later ones. There is a thin, black line along the edge that was the inside of the bowl. This line is slightly irregular as the smoke from the smudge that was used in the blackening process seems to have penetrated more deeply in some areas than in others. Surfaces were scraped and smoothed and the interior was given a semipolish. The rims were direct and tapering and the black from the smudge sometimes penetrated the paste completely along this portion of the vessel wall. Breakage is along irregular lines and the edges of the fracture tend to crumble. The main distinction between this form and later examples is that the latter have a somewhat finer paste texture, were tempered with sand and some potsherds, have thinner walls, and a smoother interior finish. The exterior gray is also consistently lighter in shade. No slip appears on any of these vessels and the black is dull, not shiny like that of subsequent examples. The paste texture of the black-interior, white-exterior bowls is fine and hard. Ground potsherds were used in tempering the clay. The paste color is gray with a white streak on the exterior side and a black one on the interior. The smudging penetrated rather deeply into the paste. Surfaces were scraped, smoothed, and lightly polished. The rims are direct and tapering with a rounded lip. Breakage is along regular lines and the edges of the fracture are sharp. In some cases the exterior was treated with a slip, in others it was rubbed sufficiently to bring the fine float to the surface and produce a pseudo-slip. The interior black is either dull or lightly burnished; it does not have the high gloss of the blackened surfaces of red bowls of contemporaneous manufacture. In places the smudge penetrated entirely through the thinned portion of the vessel wall and shows on the exterior in small splotches just below the rim. The paste texture of the brownish-gray exterior group is similar to that of the light-gray exterior specimens; it is medium with a rather flaky appearance. In tempering the clay the potters employed a light-colored sand and some ground potsherds. Surfaces were scraped and smoothed, scraping marks are occasionally present on the exterior, and the interior was lightly polished. Paste color is gray. The exterior is slightly mottled with gray and brownish-gray areas, the interior a dull black. Rims are direct and tapering with rounding or flattish lip. Smudge splotches appear on the exterior just below the rim. Breakage is along somewhat irregular lines and the edges of the fracture have a tendency to crumble. The brown-red group is noticeably different in paste texture. It is fine and hard, although somewhat striated in appearance. The material used in tempering is not distinct. Occasional pieces of light-colored sand are present, but are too sporadic to have functioned well in the capacity of a binder. Finely pulverized potsherds may have been used. Surfaces were scraped and smoothed, scraping marks sometimes show on the exterior, and the interior was lightly polished. In most cases a slip was applied. Rims are direct and slightly tapered with rounding or flattish lips. Breakage is along regular lines and the edges of the fracture are sharp but have a slight tendency to crumble. The interior black has a slight gloss and the exterior ranges from brown-red to reddish splotches.[60] The bowls with red exterior are characterized by a medium to medium-fine paste texture, although it tends to be somewhat flaky in appearance and there are sporadic small cavities in the core. Material used in tempering the clay consisted of some ground potsherds, light-colored sand that may have been in the sherds prepared for the purpose, some dark, angular material suggestive of a shale or form of lignite, and small particles of an unidentified white substance that is not unlike flakes of shell yet does not seem to be that substance. The color of the paste is gray to black from the center toward the side that was the smudged interior of the bowl and brown to reddish brown from the center toward the surface that was the exterior of the vessel. Surfaces were scraped and smoothed, lightly polished on the exterior and well polished on the interior. Rims are direct, slightly tapering and with flattened lips. There are smudge splotches on the exterior along the thinned-wall area just below the rim. Breakage is sharp and regular with only a slight tendency for crumbling along the edges of the fracture. The interior ranges from a grayish black to a good black with a medium gloss. The exterior is a variegated brownish red to red. In most cases a slip was applied. All of the bowls with black interior, regardless of the particular group to which they belong, are characterized by irregular smudged splotches or firing clouds on the exterior.

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[59] Certain features, particularly color and paste, in this group suggest the so-called Dead River black on white (Mera, 1934, pp. 8–9) yet it is not clear in descriptions of the latter what the pigment type was, and if the statement Kana-a designs includes Kana-a carbon paint, the present comparison would not be valid. Various designs called Kana-a are also typically Chaco I or Kiatuthlanna, the main difference being that of the carbon or iron pigment used in applying the decoration. If Mera's Dead River black on white has an iron pigment, the Whitewater Little Colorado Developmental specimens may well represent a variant of that form; if not, they probably are a hybrid comparable to it in that the vessel proper was derived from the same sources while the style of decoration is attributable to influence from the Chaco pattern.

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[60] In many respects these bowls correspond to the type called Woodruff Smudged, (Mera, 1934, pp. 6–7) that centers along the Little Colorado River south of Holbrook, Ariz., and west of the Petrified Forest, but there is just enough variation to make close correlation questionable. The Whitewater form may represent a local variant of a basic type from which the Woodruff was also derived, which accounts for the similarity.

The paste of the early Developmental Pueblo black on red, the first in this series of wares, is medium to fine. The clay was tempered with light-colored sand and some ground potsherds. The surfaces were scraped and smoothed, exteriors were not polished and interiors were given a semipolish before the slip was applied. The paste color is gray to gray brown. Rims are direct and slightly tapering with a flattened lip. Breakage occurs along regular lines with sharp edges to the fracture and only a slight tendency toward crumbling. Interiors are a light red that has a suggestion of stippling due to the projecting particles of the light-colored tempering material. The slip has a tendency to be thin and in places shows marks of the mop, the folded fabric used to apply the wash of "liquid clay." The exteriors were not always treated with a slip and when this was omitted they are characterized by large gray splotches, firing clouds, and small areas with grayish-red hues. Those with a slip have an exterior color similar to that of the interior, with evidences of the mop and large firing clouds. The pigment used in the decorations was a mineral paint ranging from a brownish black to a thin black in tone. In places it has a slight metallic sheen suggestive of graphite in its appearance.

The paste of the red bowls with decorations suggestive of Showlow black on red [61] is medium to fine in texture. Ground potsherds, some sand, and some dark-colored angular material were used in tempering the clay. The paste color ranges from a pinkish brown to a brownish red in color. Surfaces were scraped and smoothed, with medium to good polish on both exterior and interior. Rims are direct and slightly tapering with flattened lips. Slip was applied to both interior and exterior and is rather thick. It has a tendency to flake off or become somewhat powdery. The color is a good red, although not quite a maroon. The designs were painted in an iron pigment and are a dull black. The bowls in this group have flattish bottoms with slightly curved, vertical sides. The ware has some of the characteristics of both the Wingate black on red [62] and the Puerco black on red [63] but has sufficient variation from each to set it apart. There undoubtedly is some relation between all three forms, however.

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[61] Haury, *in* Gladwin, 1931, pl. 31, lower.

The Whitewater black on red comparable to the Wingate black on red has a medium to fine texture. The clay was tempered with ground potsherds and some sand, and a small percentage of light-colored angular particles that may be some kind of pulverized rock. The paste color ranges from a grayish pink to cream. Surfaces were scraped, smoothed, and lightly polished. A heavy red slip is present on both interior and exterior surfaces. It has a tendency to flake off. The color is a good red or a maroon red. The rims are direct with a slight taper and rounded or flattish lips. The rims are uneven around the periphery. Breakage tends to be somewhat irregular with some crumbling of the edges of the fracture. The paint used in the decoration was an iron-carbon mixture and is a dull black. The bowls in this group have rounded bottoms and naturally curving sides and border on the line between the deep and shallow forms. The only difference between this group and those with a corrugated exterior [64] seems to be in the treatment of the exterior. Paste qualities and other characteristics are the same.

There is considerable range in the sizes of the bowls as a group. Some of the special types do not have a marked variation, while others include the limits of the class as a whole. All forms cover a diameter range from 3¾ inches (9.52 cm.) to 11½ inches (29.21 cm.), and heights from 1¾ to 6½ inches (4.44 to 16.51 cm.). The Modified Basket Maker examples have diameters between 4¾ and 7 inches (12.06 and 17.78 cm.), with most of them falling in the range from 5½ to 6½ inches (13.97 and 16.51 cm.). Heights are from 2½ to 4⅛ inches (6.35 to 10.47 cm.). Wall thicknesses are from 5/32 to 7/32 of an inch (3.9 to 5.5 mm.). None of the larger sizes commonly found in this horizon farther north and east are represented in the collection.[65] Chaco I bowls have diameters from 4 to 10¼ inches (10.16 to 26.03 cm.), heights from 1¾ to 4½ inches (4.44 to 11.43 cm.), and wall thicknesses from $\frac{3}{32}$ to $\frac{7}{32}$ of an inch (2.4 to 5.5 mm.). The Red Mesa black on white, the Chaco Transitional form, diameter range is 5¼ to 8¾ inches (13.33 to 22.22 cm.), height range 2½ to 4¼ inches (6.35 to 10.79 cm.), and wall thicknesses from $\frac{9}{64}$ to $\frac{13}{64}$ of an inch (3.5 to 5.1 mm.). The subsequent form, Escavada black on white, or Chaco Degenerate-Transitional, has diameters varying from 3¾ to 9½ inches (9.52 to 24.13 cm.), heights from 1¾ to 4½ inches (4.44 to 11.43 cm.), and wall thicknesses from $\frac{3}{16}$ to ¼ of an inch (4.7 to 6.3 mm.). The final type in the Chaco series, the one probably corresponding to Gallup black on white,[66] has bowl diameters from 5 to 11½ inches (12.7 to 29.21 cm.), heights from 2½ to 5¼ inches (6.35 to 13.33 cm.), wall thicknesses from $\frac{9}{64}$ to $\frac{13}{64}$ of an inch (3.5 to 5.1 mm.). The Kana-a black on white bowls in the collection have diameters from 3¾ to 8½ inches (9.52 to 21.59 cm.), heights from 1⅞ to 3⅝ inches (4.76 to 9.2 cm.), and wall thicknesses from $\frac{7}{64}$ to $\frac{15}{64}$ of an inch (2.7 to 5.9 mm.). Most of these vessels, however, are in the diameter range of 8 to 8¼ inches (20.32 to 20.95 cm.), and height range from $3\frac{1}{16}$ to $3\frac{9}{16}$ inches (7.77 to 9.05 cm.). The Little Colorado variant of Kana-a black on white bowls have a diameter range from 6 to 8¾ inches (15.24 to 22.22 cm.), heights from 2¾ to 3⅞ inches (6.98 to 9.84 cm.), and wall thicknesses from ⅛ to ¼ of an inch (3.1 to 6.35 mm.). Bowls of the Little Colorado form considered a variant of the Chaco early Developmental black on white range from 5 to 9 inches (12.7 to 22.86 cm.) in diameter; 2 to 3½ inches (5.08 to 8.89 cm.) in height, and have wall thicknesses from $\frac{5}{32}$ to $\frac{9}{32}$ of an inch (3.9 to 7.1 mm.). The black interior bowls as a group have a diameter range from 3¾ inches to 9⅞ inches (9.52 to 25.08 cm.), heights from 1¾ to 4⅞ inches (4.44 to 12.38 cm.), and wall thicknesses from $\frac{5}{32}$ to $\frac{7}{32}$ of an inch (3.9 to 5.5 mm.). The black on red wares are too fragmentary for measurements.

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[62] Gladwin, 1931, pp. 29–31.

[63] Hawley, 1936, p. 47; Colton-Hargrave, 1937, pp. 120–121.

[64] Mera, 1934, p. 11; Colton-Hargrave, 1937, p. 119.

DESIGNS ON THE PAINTED VESSELS

Decorations painted on the surfaces of vessels in the nonculinary group were applied to the exteriors of the large jars, pitchers, canteens, and seed jars, and to the interiors of scoops, ladles, and bowls. An occasional design is noted on the exterior of bowls, but considering the group as a whole this treatment is rare. When it does occur it is generally on specimens belonging to the late horizons rather than to the older levels. The outstanding features in the decorations are the elements used and the style of patterns prevailing at different stages in the ceramic sequence in the Whitewater District. These correlate closely with developments in other portions of the Anasazi province and despite the factor of the time lag previously discussed [67] show the same order of progression. The main difference is in the interval between the appearance of certain forms. Toward the end of the Developmental Pueblo period the succession was more rapid and the life span of each style was shorter than in nuclear parts of the province. This probably is attributable to an acceleration in diffusion that tended to offset the former lag and bring the peripheral precincts into closer synchronization with general trends by curtailing the duration of forms rather than omitting them altogether, a thing which happened in some districts.

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[65] Morris, 1927; Roberts, 1929.

[66] Hawley, 1936, pp. 42–43; Hawley, 1934, pp. 38–41, called semipolished black on white in the latter.

During the earlier stages in the Whitewater District the elements used in decorations were simple dots, series of dots framed by bordering lines; zigzag, parallel, stepped parallel, ticked and dotted, squiggled or undulating lines; solid triangles, ticked triangles, triangles with dots, stepped triangles, scalloped triangles, triangles with rectilinear tips or hooks projecting from the apex, triangles with curvilinear tips or volutes, triangles with open spaces enclosing a circle, dot, cross or other small figure; terraced or stepped symbols with short lines rising vertically from the riser to each step or extending horizontally from the tread; volutes or curvilinear scrolls and ticked or dotted volutes; triangular and rectangular frets, curvilinear frets, interlocking frets, and running frets; checkerboard patterns; and occasional simple representations of human or animal figures by means of single line drawing such as children often make. These elements were combined in various ways to make typical and pleasing patterns. Subsequently heavy, solid figures became the vogue with broad lines used as meanders or frets, enlarged and lengthened triangles suggestive of pennants or, when projecting from broad lines, leaves of plants, and heavy scrolls and curvilinear symbols contributing to the boldness of the decoration. Accompanying this type of pattern was one characterized by contrasting solid and hachured figures. Both forms appear to have been a direct development out of earlier decorations. In the following discussion of the designs there will be no attempt to interpret the so-called symbolism, to find esoteric or mythological significance in the various combinations of elements or repetitions of the motif. A study of that nature belongs in the field of speculative art and, as the results obtained would be based for the most part on guess work, it is not deemed advisable to undertake such a treatment here. Consideration of stylistic features and general characteristics of the patterns and the sequence of their development is sufficient to demonstrate horizon differences and the effects of various influences.

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[67] Part I, pp. 262–263.

The large jars had two zones of decoration. The major one was around the body of the vessel, the minor one around the neck. In some cases the main pattern extended from the base of the neck to the bottom of the jar, in others it was little more than a band around the shoulder or area of greatest diameter. On rare examples an all-over decoration was used and the design extends from the rim of the aperture down the neck and over the entire body. This form appeared late in the Developmental Pueblo period and is largely restricted to the solid or heavy type of pattern suggestive of plant leaves. No indications were found of decorations on the jars of the Modified Basket Maker wares. The early Developmental Pueblo forms were characterized by bands around the body and rather simple figures on the necks. A typical example of the form is that on the jar (fig. 7), which also illustrates the somewhat modified body shape derived from the Modified Basket Maker globular vessel with tapering neck. The main elements in this decoration are triangles, parallel lines, and stepped parallel lines. The series of opposed triangles separated by the set of parallel-stepped lines is characteristic. They are combined with chevronlike figures to make a pattern that is repeated four times, two erect and two inverted, in the band. The failure of the potter to make the lines meet at the corners in the parallel-stepped series separating the opposing rows of triangles is a feature frequently observed. The ornamentation on the neck consists of two symbols, placed at opposite sides, formed from parallel-stepped lines or, if preferred, from parallel meanders. These two figures are pendant from a single line encircling the neck. Just below the rim is another encircling, single line. No complete vessels in three of the other body shapes of the early Developmental period (fig. 5, *a*, *b*, *c*) were found and it is not possible to illustrate their decorations. The portions of the jars indicate, however, that they had the same type of designs as are present on similar vessels found in the Chaco Canyon pottery of the same horizon[68] and other sites under the Chaco influence. Not all of the decorations in this group have the bordering line at the bottom of the band, however. Some of them have an irregular lower border composed of stepped-parallel lines like the designs on some of the pitchers, figure 10, for example. As a matter of fact this style is more characteristics of the jars belonging to the Red Mesa black on white than the plain band form.

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[68] Judd, 1924, pl. 4, *a* and *b*.

An illustration of a more elaborate pattern composed of a number of simple elements is that shown in figure 8. This decoration is painted on one of the jars of the globular body with slightly depressed top and secondary swelling in the upper zone type (fig. 5, *d*). There are two main patterns on the vessel. One occurs on the principal body zone, the other on the upper portion. The neck is missing hence it is not possible to tell whether it was decorated or not. The decoration around the body proper consists of four similar, although not identical, chevron figures pendant from a line encircling the jar just above the shoulder. Each of the pendant chevrons is made up of a row of three fret figures in hachure, the framing lines of which are straight and form a rectilinear fret, and the composing lines are squiggled or undulating. Hachure figures

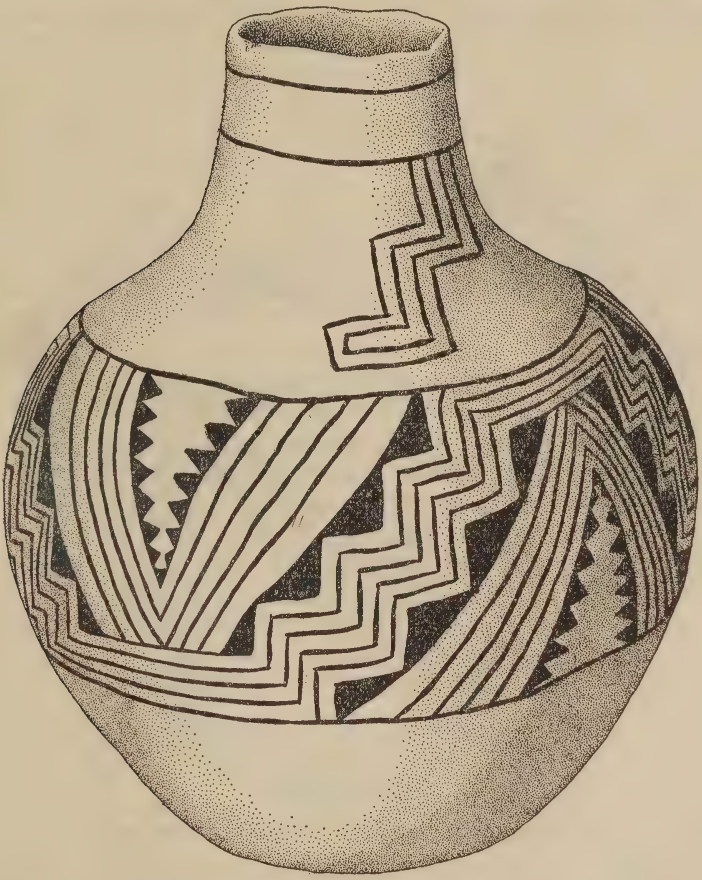

FIGURE 7.—Design on large black-on-white jar.

with squiggled composing lines are characteristic of the Developmental period, particularly its earlier stages. Below this are three, in one example only two, rows of opposed triangles with dotted triangles, also opposed, at the ends of the rectilinear tips. In two of the figures the top row has three, the second two, and the third one of these motifs. The other two have four for the top, three for the second, and one has two for the third while the other has no third row. At the lower tip of the chevron on three of the figures is a triangular-shaped area of squiggled hachure. This is missing from the other figure, the one that also lacks one row of the opposed triangles. A series of 10 parallel lines, that is to say as nearly parallel as the potter could draw them with a brush on a curved surface, forms a continuous lower border for the pattern. In a sense this treatment is comparable to that where parallel-stepped framing lines are employed; the general effect is the same. The decoration on the upper part of the jar consists of three main figures in which there

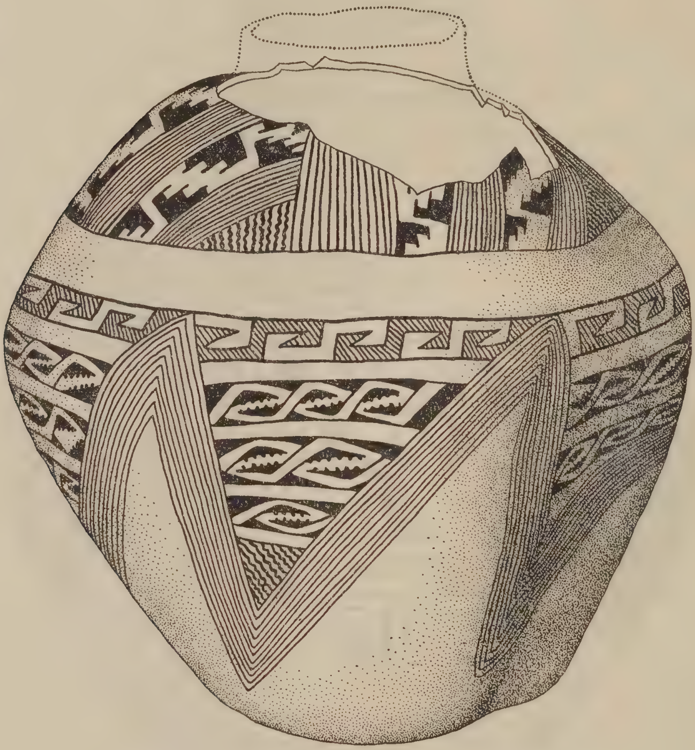

FIGURE 8.—Design on late Developmental Pueblo jar.

are panels composed of opposed terraced figures with short lines or tips projecting from the corners. The panels are separated by series of parallel lines, the number in each series varying from 8 to 12. At the lower right-hand corner of the main figures is a triangular-shaped area of squiggled hachure similar to that in the decoration around the body proper. The panels of opposed terraced elements and the series of parallel lines start obliquely across the field of decoration but, due to the curve of the jar, the last series to the left in each of the main figures is practically vertical and serves to separate one figure from another. This particular jar represents a late phase in the Developmental period while the preceding example (fig. 7) is from the beginning stage.

No complete jars with decorations in the solid, heavy type of pattern or the contrasting solid and hachure style of design were recovered. The patterns, as indicated by the potsherds and portions of vessels, were comparable to those from the Village of the Great Kivas on the Zuñi Reservation[69] and other sites where there was a strong Chaco influence. These vessels belong to the end of the Developmental Pueblo and the beginning of the Great period. Fragments from jars found in the refuse in the rooms and on the dump at the third unit dwelling[70] indicate that designs consisting of rectilinear meanders and running frets composed of straight-line hachure were the predominant style of decoration when that structure was occupied. Both the type of hachure and the general motif of the designs are typically Chaco in character. The other forms are more like those considered as characteristic Little Colorado or Tularosa decorations.

There were several design zones on the pitchers. As in the case of the large jars, the neck formed one zone, the body another. In some styles of decoration the entire vessel, body and neck, was treated as a single zone. The latter was not common, however, until about the middle of the Developmental period and continued into the subsequent Great Pueblo stage. The handles were generally treated as a separate zone for decoration. As previously mentioned, painted pitchers in the Modified Basket Maker horizon are rare. The only example in the present collection is the one illustrated on plate 10, *c*. The decoration in this case consists of a simple band around the body of the vessel. The main elements are an upper and a lower framing line and a series of vertical cross lines from which triangles with curved tips or hooks project. There are two of these on each line. Some of them are so poorly drawn that they suggest thick-based hooks rather than triangles with hooks. The pigment is a thin, brownish black.

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[69] Roberts, 1932, figs. 19, 20.
[70] Part I, pp. 227–244.

Considered as a whole the design is good in conception but poor in execution. The potter apparently was working in a none too familiar medium.

An example of a single-band decoration covering a greater part of the body of a pitcher is illustrated by the specimen *d*, plate 11. The elements in this design are merely parallel lines and ticked lines arranged in such a fashion that they form triangular figures separated by series of parallel, oblique lines. The pattern is extremely simple, yet quite effective.

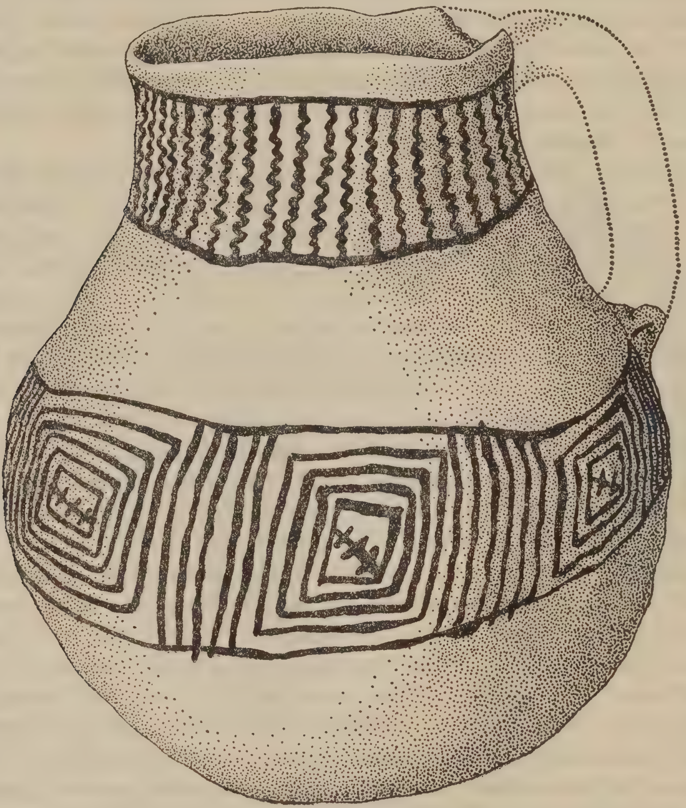

FIGURE 9.—Decoration on early Developmental Pueblo pitcher of the Little Colorado series.

A combination of two simple bands, one around the neck and the other around the body, makes an effective decoration for one of the full-bodied, tapering neck pitchers (fig. 9). The design around the neck consists of a broad band of squiggled hachure with fairly heavy composing and framing lines. This was a popular form of decoration for the neck in the earlier phase of the Little Colorado type of Developmental Pueblo vessels at this site. Another example of it appears on the pitcher *b*, plate 11. The body bands are different, however. On the first example (fig. 9) the motif consists of a series of concentric squares separated by sets of parallel lines. There is no consistency in the number of concentric squares in each unit of the pattern, one has three, two of them four, and the others five. The same holds true for the separating lines which occur in groups of four, five or six. In the center of each square, though, is an oblique-ticked line. Despite the irregularity of the units the pattern as a whole gives the effect of an orderly decoration. The band around the body of the second pitcher (pl. 11, *b*) is composed of opposed rows of simple triangles separated by a dotted line. Below the band are two plain, approximately parallel lines encircling the lower portion of the body. On both of these vessels the pigment in the decoration is a brownish black in some places and black or brown in others. The firing was not sufficiently controlled to produce an even color throughout.

Designs that are more characteristic of the early stage of the Developmental period than those just described are exemplified by vessels *d* and *e*, plate 10. The first is one of the Kana-a black-on-white series. It has a simple band around the neck consisting of opposed triangles with short, straight tips. Between the upper design and that around the body is a single line. The band around the body is composed of four units in which the elements are contiguous triangles and open triangles with an enclosed dot. The lower portion of the design is a series of three roughly-parallel stepped lines. The thick and thin character of the lines with a tendency to blurred edges is typical of the Kana-a decorations. The second pitcher (pl. 10, *e*) also has a body decoration consisting of four units bordered by a series of three parallel-stepped lines. The elements in the units are dotted triangles and dotted lines. The design on the upper part of the vessel differs somewhat from the first in its position as well as in the nature of the motif. Instead of encircling the neck, which in this case was shaped to represent the handle of a gourd, the pattern in the form of a panel extends along the top. The main elements in the units are opposed, dotted triangles. The dots on some of the triangles, however, are so large that they produce the effect of a scalloped triangle. The units are separated by sets of parallel lines. Inasmuch as a portion of the combination handle-neck is missing, having been broken while in use by the makers and the edges smoothed down to make a new aperture, the number of units in the panel cannot be determined. Judging from the average length of the handle-necks on such vessels it seems that three is the probable number, yet there may have been more. The same style of design as that on the bodies of *d* and *e*, plate 10, but with somewhat different elements in the pattern, was used on the pitcher illustrated in figure 10. In this case the same motif was employed for both the upper and lower decorations, although there is some difference between the units in each. The design around the neck has three units composed of opposed-scalloped triangles. These are framed by a series of three parallel-stepped lines.

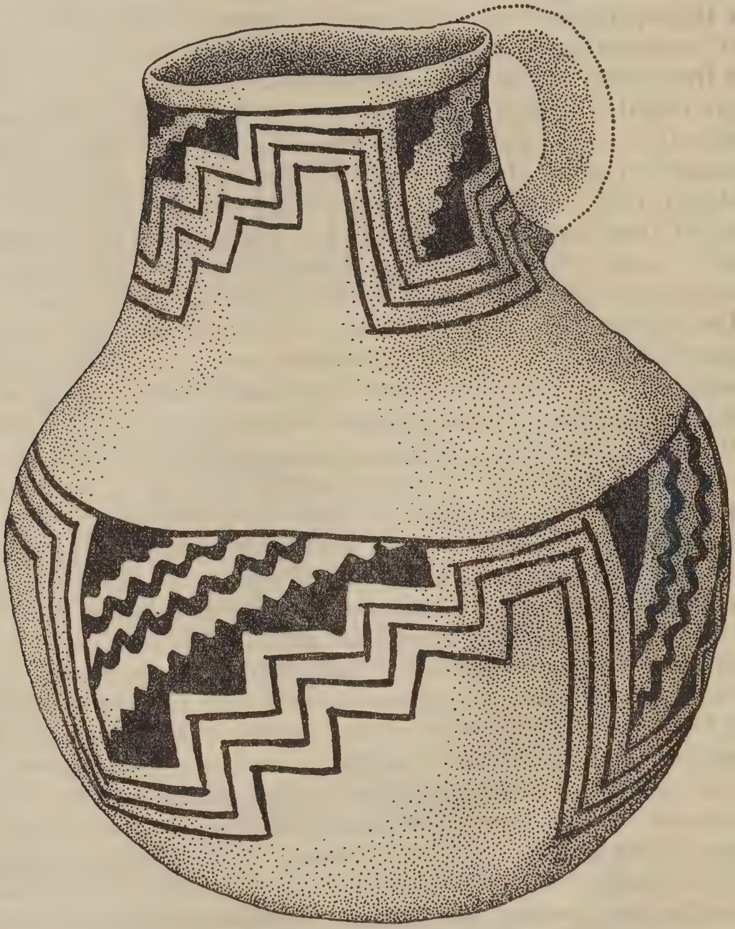

FIGURE 10.—Design on Developmental Pueblo pitcher of Chaco type.

The bottom decoration, that around the body of the vessel, also has three units. Two of them are composed of opposed triangles separated by two squiggled or undulating lines, the third has opposing-scalloped triangles that are separated by two lines that appear to be squiggled but which actually are two lines crossed by zigzag lines in which a number of the corners are rounded as the result of too rapid brushwork. Here again are the three parallel-stepped bordering lines at the bottom of the design. This style of decoration is typical of the early Developmental period both on the Kana-a black on white and on the Chaco I or Kiatuthlanna black on white and occurs on vessels other than pitchers.

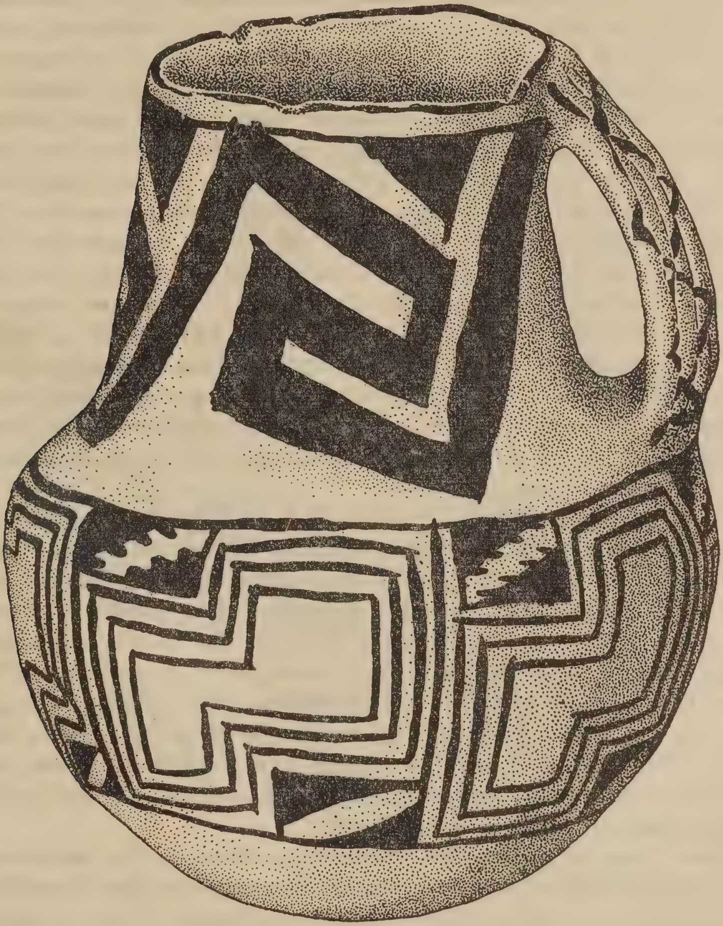

FIGURE 11.—Pitcher design from middle Developmental Pueblo phase.

The opposed triangles and parallel-stepped line motif was also used in other styles of design. They sometimes were combined in the units in a band decoration and did not present the irregular lower border noted in the preceding examples. A good illustration of this is the pattern around the body of the pitcher shown in figure 11. There are five units in this band. In the upper left-hand corner of each are opposed triangles alternately dotted and ticked. On some of them the dots are so large that they suggest a scalloped rather than a dotted triangle, but they were actually placed on the element as dots. The brush was a little too full and the pigment spread where the dot touched the triangle and produced the scalloped effect. The latter, however, when intentionally drawn was obtained by a continuous undulating movement of the brush. At the lower right-hand corner of each unit is a figure composed of two opposed, plain triangles. The space between the two figures with the triangular elements is filled with concentric, 8-sided, rectilinear symbols made up of parallel-stepped lines. The upper zone on this pitcher has a heavy-line rectilinear meander suspended from a line encircling the neck just below the rim. Pendant from this same line, between the places where the meander touches it, are solid triangles with short, straight-line tips. The handle has a simple pattern formed from two zigzag lines that cross each other in such a manner that they make open diamond figures. The ornamentation was completed by painting the lip of the rim. This particular pitcher and the style of decoration represents a slightly later phase than the others on which the opposed triangles and stepped-line elements were employed. The trend toward heavy, broad lines such as that in the meander around the neck began about midway of the Developmental period.

The use of lines crossed by zigzag lines as a separating figure between rows of opposed triangles, as noted in the units in the band on the body of the vessel shown in figure 10, was rather common and led to modifications that at times produced curious effects. This was the case in the design around the body of the pitcher illustrated in plate 12, *d*. Here the main band is composed of two rows of opposed triangles separated by a line of erect and inverted triangles that resulted from filling in the angles produced by the drawing of a straight line with an overlying zigzag. The brushwork is not particularly good on this specimen, but it demonstrates one method of design treatment that was not unusual.

Other forms of the triangle element are shown in the decorations on pitchers *a* and *b*, plate 13. On the first specimen the dotted triangle with curved tip or volute is the chief element in both the upper and lower bands. The latter are made up of a series of units in which the dotted triangles are opposed and the curved tips or volutes interlock. The units are separated by sets of double parallel lines. The second example (*b*) has two bands in which the units are very suggestive of those described in the decorations on some of the preceding pitchers. The main elements in the units are opposed triangles, scalloped triangles, stepped triangles with interlocking curved tips, and dotted lines. The distinctive feature in this particular case is the omission of the bordering stepped-parallel lines. This is a trend which started about midway of the Developmental period and reached its culmination in the heavy, balanced designs composed of opposing figures that prevailed in the latter part and continued over into the Great Pueblo stage. At about the time the stepped-parallel lines were beginning to disappear there was an increase in the use of straight parallel lines of the type that were employed in band designs to separate the units in the pattern. The difference between these and the earlier forms is that they tend to become a part of the unit rather than part of a frame to set it apart. This is shown in the decoration around the body of the vessel in figure 12. The design is of the band type with L-shaped units composed of a series of opposed-dotted triangles and parallel-straight lines. The particular way in

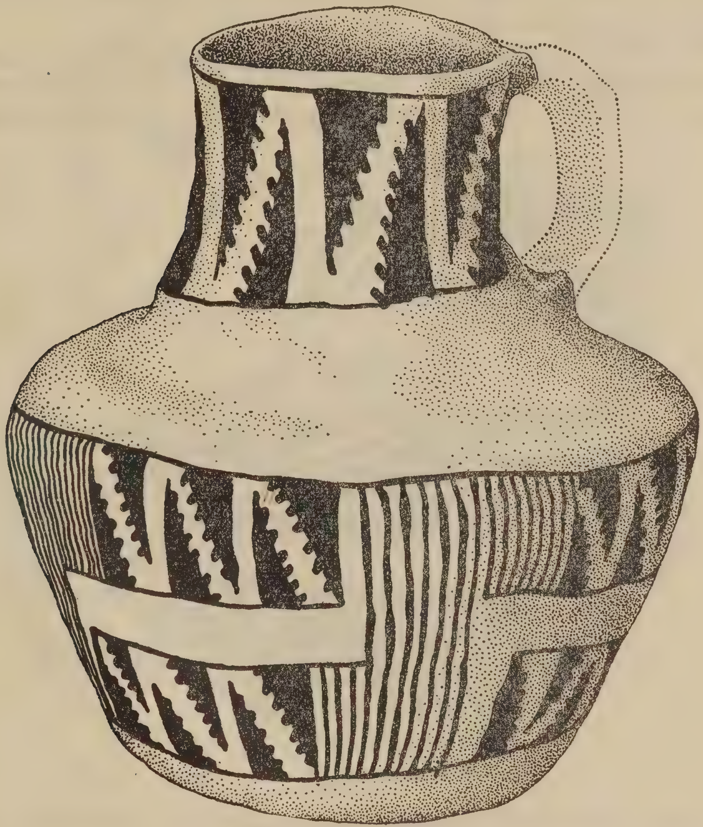

FIGURE 12.—Decoration on pitcher of Little Colorado series from middle Developmental Pueblo stage.

which the latter are used is believed by some to be the genesis of the type of hachure decoration that is called the Little Colorado or Tularosa style.[71] Others are inclined to question the idea, but that such may have occurred is not beyond the realm of possibility. The band around the neck of this vessel is composed of a series of opposed-ticked triangles. These triangles are of the elongated shape that seems to have developed into the pennant and leaflike symbols of a slightly later phase.

Elongated-scalloped triangles, dotted triangles, terraced figures with projecting dotted lines, opposed triangles, and parallel bordering and framing lines are the elements from which the patterns decorating one of the bird-shaped pitchers were formed (fig. 13). This vessel also furnishes an interesting example of several design zones. One is around the body, another is on the flattened upper portion, a third is around the neck, and a fourth is on the handle. The band around the body is composed of six units separated by series of straight-parallel lines. The number in each set varies from 8 to 12. Each unit consists of corner triangles, opposed-terraced figures with projecting dotted lines, and oblique-parallel lines separating the terraced elements. Two lines separate the corner triangles

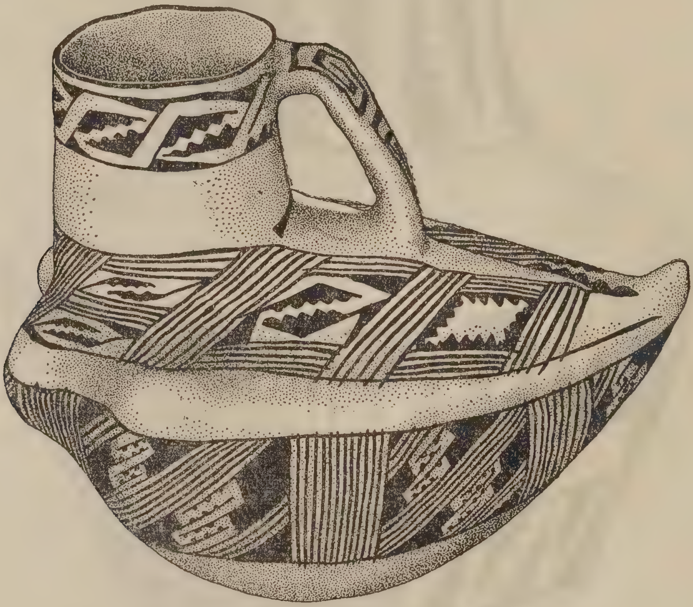

FIGURE 13.—Design on bird-shaped pitcher.

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[71] Gladwin, 1931, pp. 19–23.

from the terraced figures in each case and four or five intervene between the opposed-terraced portions of the design. The decoration on the upper part of the body extends in a band around the base of the neck and continues back to the pointed end of the body with its stubby representation of a bird's tail. The band is not continuous. It merely runs out near the base of the tail. There are six complete units, one that was partially finished, and one consisting solely of the space without any elements, in this design. Opposed triangles, opposed-scalloped triangles on the ends of lines projecting from plain triangles, dotted triangles, and parallel framing lines are the elements in the pattern. An interesting factor about this part of the ornamentation on the vessel is that the extensions on each side from the neck back to the pointed end are suggestive of the folded wings of a bird. The pattern around the neck of the vessel just below the rim consists of a series of opposed triangles

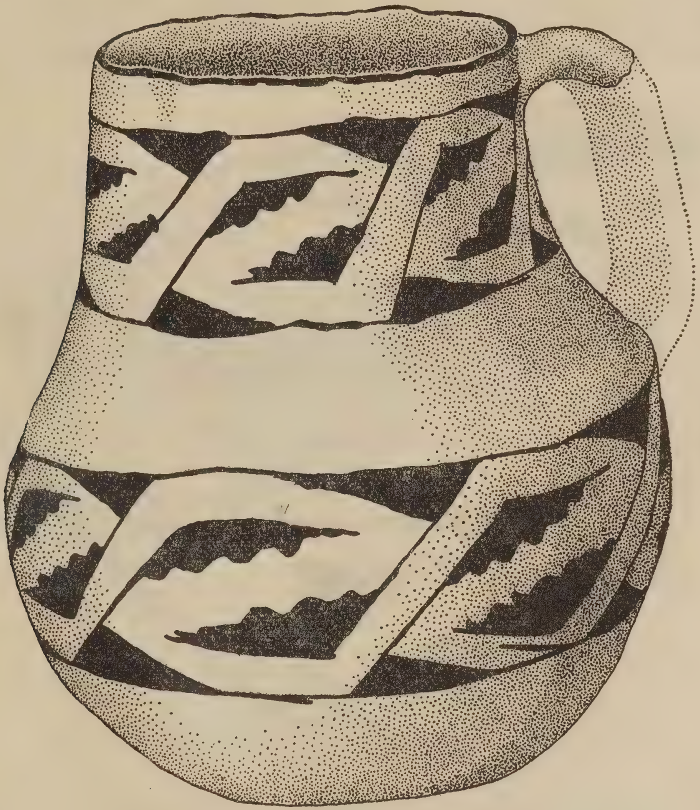

FIGURE 14.—Middle Developmental Pueblo pitcher decoration.

with projecting lines that support opposed-scalloped or dotted triangles of the pennantlike form. The ornamentation on the handle consists of a rectilinear fret figure. The lip of the rim was also painted on this vessel.

Two band decorations on another pitcher, one around the neck and the other around the body, are almost identical with that around the neck of the vessel just described (fig. 14). In the designs on the present example the brushwork was not as well done as that on the bird-shaped pitcher, but the decoration is quite effective. The lip of the rim was painted and there was some kind of design on the handle, as indicated on the stub that was left when the major portion was broken off. Not enough remains, however, to indicate the type of decoration. A simpler form of the opposed triangle with projecting lines supporting additional opposed triangles, in this case neither dotted nor scalloped, is seen in the band design around the body of the ring-bottomed pitcher (pl. 14, *g*; fig. 15). This is a good example of a simple pennant style of element. The decoration is further augmented, however, by the oblique, ticked lines connecting some of the other elements. The squiggled lines

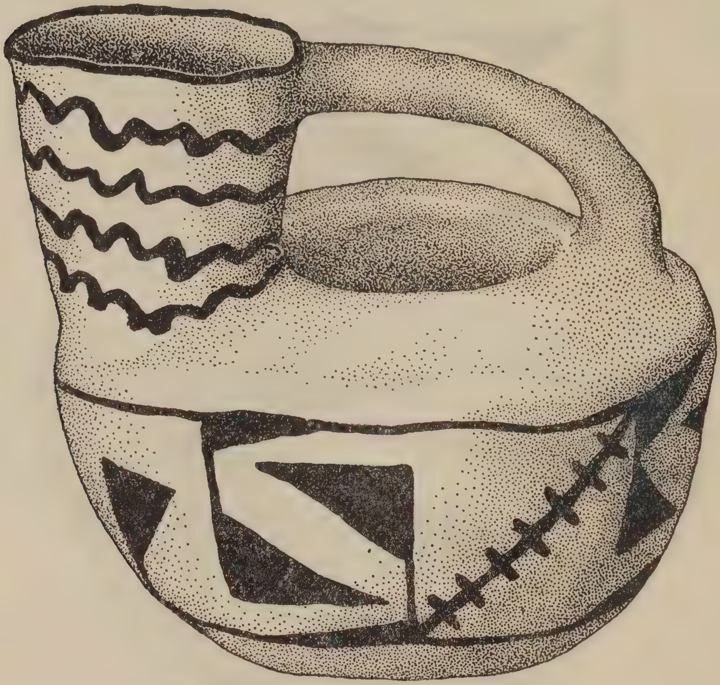

FIGURE 15.—Decoration on ring-bottomed pitcher, side view.

around the neck of the vessel were more crudely drawn than many examples of that motif and contrast rather sharply with the better delineation of the elements in the main decoration. The lip of the rim was painted with a solid line and the handle has a single, median line extending from the rim to the point of juncture with the body (fig. 16). The handle line shows clearly that it was made with two strokes of the brush and that the potter failed to join the ends properly. It is curious that as large an area as the flattened top of this pitcher was left without any decoration. This is rare. Advantage was usually taken of such spaces and fragments from other pitchers of this type show that designs were placed there. The other ring-bottomed vessel illustrated (pl. 14, *h*) was so treated. The decoration on this pitcher is rather simple, consisting as it does of rows of triangles and triangles pendant from the rim. The painting in this design was not well done and exhibits one of the characteristics of the Escavada black on white in that respect.

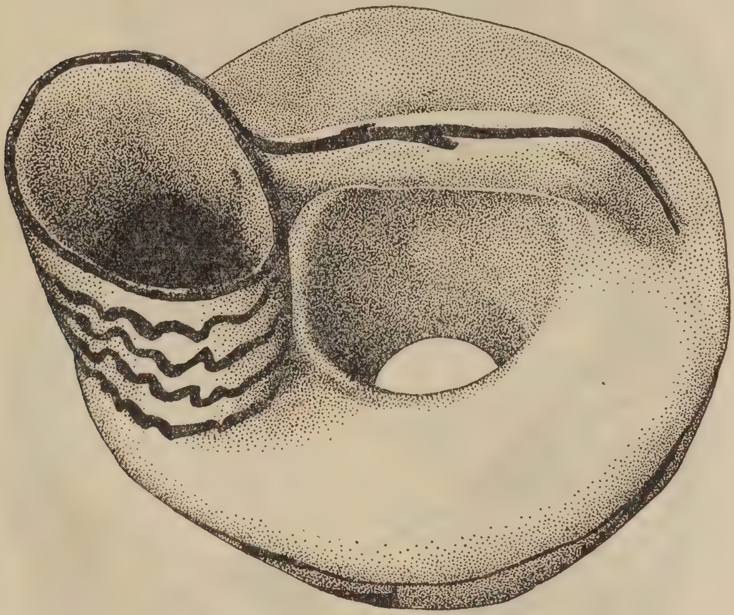

FIGURE 16.—Top view of ring-bottomed pitcher.

The use of dotted triangles and dotted-line elements in the stage following the shift from the parallel and stepped-parallel bordering and framing line style of decoration is well shown by one of the pitchers from approximately the middle of the Developmental horizon (fig. 17). On this specimen there are two bands encircling the body and one on the neck that does not make the complete circuit, an open space occurring beneath the handle. The two bands around the body are the same with units composed of opposed-dotted triangles separated by dotted lines that connect the projecting tips of the triangles. The design around the neck differs in that there are two of the dotted lines in each unit instead of the one. The rim of this vessel is painted and there are two lines extending from the rim to

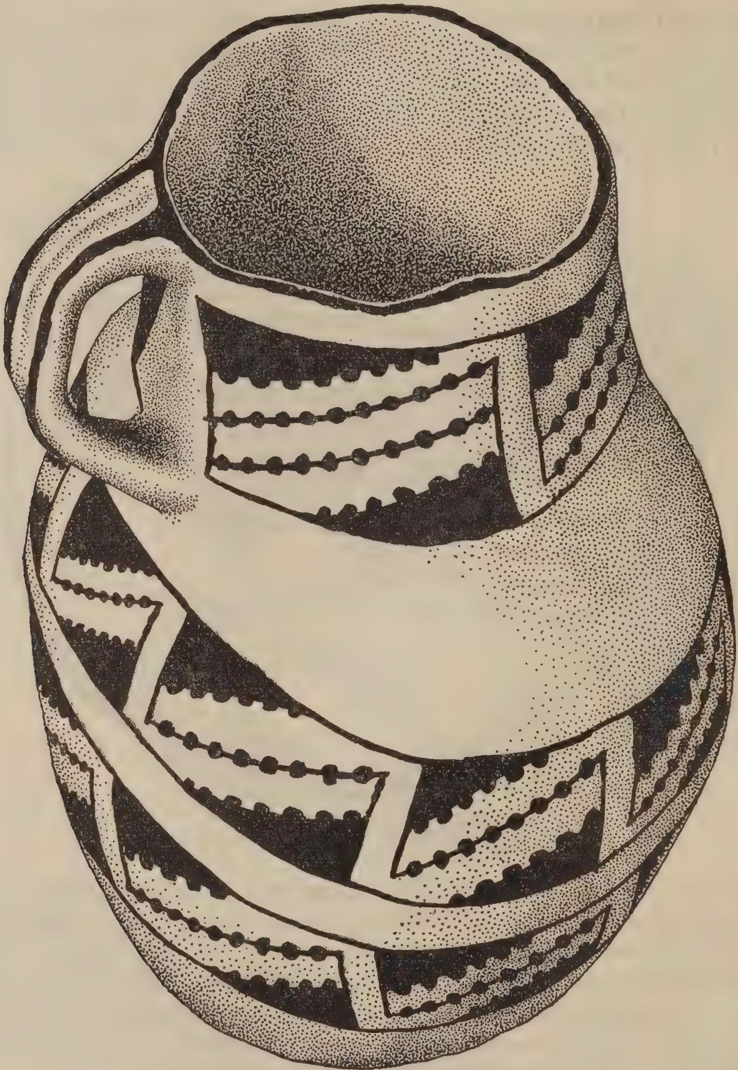

FIGURE 17.—Chaco series middle Developmental Pueblo pitcher design.

the shoulder on the outer edges of the handle. The latter is slightly concave and the lines serve to emphasize that feature. This particular pitcher is unique in that the body has an oval horizontal section rather than a circular one. It was flattened from front to back in the making and there is a slight shoulder on either side just above the top of the upper design band. Due to this feature it was necessary to tip the vessel somewhat more than usual in making a drawing of it and for that reason part of the body bands appear to follow an oblique direction when actually they are horizontal.

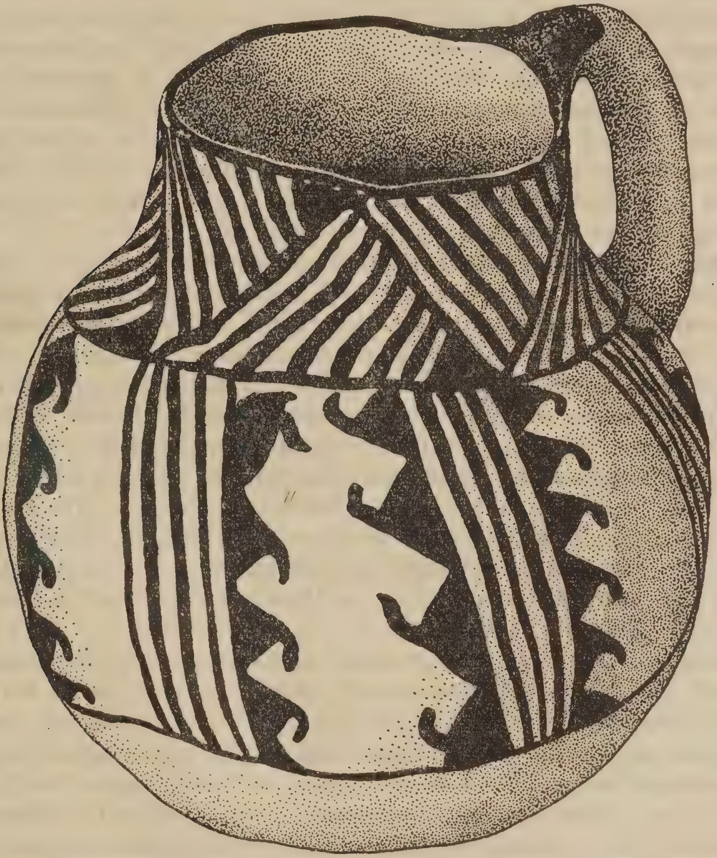

FIGURE 18.—Decoration on Little Colorado pitcher from middle Developmental Pueblo stage.

At about the time that the vogue for parallel and stepped-parallel lines was on the decline in the Chaco style of design, it took a different trend on some of the vessels indicative of a Little Colorado derivation. The lines became much heavier. A typical example is that of figure 18. On this vessel the body and neck zone bands of decoration meet, making a single pattern from the rim to well down toward the bottom of the pitcher. A difference in the character of the design distinguishes the two zones, however. The units in the band around the body are made up of opposed-tipped triangles, tipped triangles and the parallel-straight lines arranged in a pattern similar to some of those already described. The units in the band around the neck are a series of triangular figures composed of a solid triangle in one corner and a series of six parallel lines that make one form of hachure. The fact that the lines run in opposite directions in alternate units produces an impression of a folded fabric or woven style of design that is considered characteristic of the Little Colorado and of the type of pottery that has been called Puerco black on white.[72] This type of decoration is not confined to pitchers, but appears on other vessel shapes as well.

Heavy-line elements and modifications of the triangle to suggest leaves and pennants were combined in various ways to make suitable decorations. A simple form of heavy-line design is illustrated by one of the pitchers in the Little Colorado series (pl. 12, *e*). This vessel is one of the group with two zones of decoration. Around the body is a band composed of six units. Three of them are made up of three rectangular figures, merely broad lines, placed in a horizontal position and three are composed of a series of parallel lines or, as they are sometimes called, units of horizontal hachure. The decoration on the neck consists of four pendant triangular figures with parallel lines making the same style of hachure. On the handle is a single double-ticked line, that is, the ticks cross the line instead of being placed on one side.

Designs composed of the pennant and leaflike elements generally cover a greater part of the vessel, extending from rim to bottom. Two characteristic examples of this type of decoration are shown in plate 13, *c* and *d*. The first specimen (*c*) has a design that is good in concept but poor in execution. The brushwork was not well done and some of the triangular elements are not sufficiently elongated to make good examples of the pennant or leaf forms of element, yet they do suggest them. The second is a much better illustration of that feature. This same style of decoration is found on pitchers of the red-and-black wares and is typical of the late Developmental and early Great Pueblo ceramic stages. There is considerable question about the derivation of this type of pattern and its proper affinities. Some regard it as a typical Little Colorado motif, others think it basically Tularosa in its character,[73] and the problem is confused by the fact that it was a popular style in the Chaco Canyon ceramics at a slightly earlier chronological period than that of the other districts, although the cultural horizons agree. In the Chaco wares it is one of the group comprising the so-called Gallup black on white. Gladwin in the discussion of the Puerco black on white postulates that this form of decoration preceded that in which solid elements are balanced by similar figures in hachure.[74] Stratigraphic evidence in the Whitewater District and in the Chaco Canyon demonstrate that this was not the case. The combination solid and hachure designs appeared shortly before and subsequent developments were concurrent. Of course, if the style is definitely of Little Colorado origin it may have had a different position in the sequence there and its place in the Chaco series be due to a lag in influence. However, there is sufficient Little Colorado material in the Whitewater series to give an indication of the stylistic trends and this points to a slightly later inception for the form. As things stand at present, the evidence is not clear enough to warrant conclusions on the source of origin. The Whitewater phase gives the impression that it came into that district from the east with some of the Chaco styles, as the first examples are on Chaco type vessels. This would seem to indicate that the question is one concerning the Chaco and Tularosa districts. One of these pitchers has a handle of the zoomorphic type (pl. 13, *d*) that is regarded as characteristic of the Tularosa wares.

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[72] Gladwin, 1931, pp. 17–23.

Another variation of the allover style of decoration composed of pennant or leaflike elements is that on the pitcher illustrated in figure 19. This design emphasizes one of the features that is often considered typical and that is the negative character produced by the arranging of the elements in such a way that the light background strikes a balance with the painted areas and forms new figures. This is apparent in the series of open rectangular figures at the right of the design. There is the possibility that this particular trait is a Little Colorado development as it was prominent on some of the later wares and also was comparatively rare in the Chaco series.

Hachured elements in decoration occupied a rather prominent place in the development of various patterns. The earliest form of the hachure is characterized by rectilinear and curvilinear-framing lines with widely-spaced squiggled composing lines. Subsequently the composing lines became straight and progressively closer together. Examples of the early form occur on pitchers *b*, plate 12, and *e*, plate 11, as well as on the necks of the vessels previously described (fig. 9; pl. 11, *b*). The design on *b*, plate 12, consists of a series of pendant

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[73] In the Little Colorado wares it is grouped with the Puerco black on white (Gladwin, 1931, pl. 25) and in the Tularosa as one of the Reserve black on white group, the latter being considered as an affinity or derivation of the Puerco, a form that just preceded the fully developed Tularosa.

[74] Gladwin, 1931, p. 25, pl. 29.

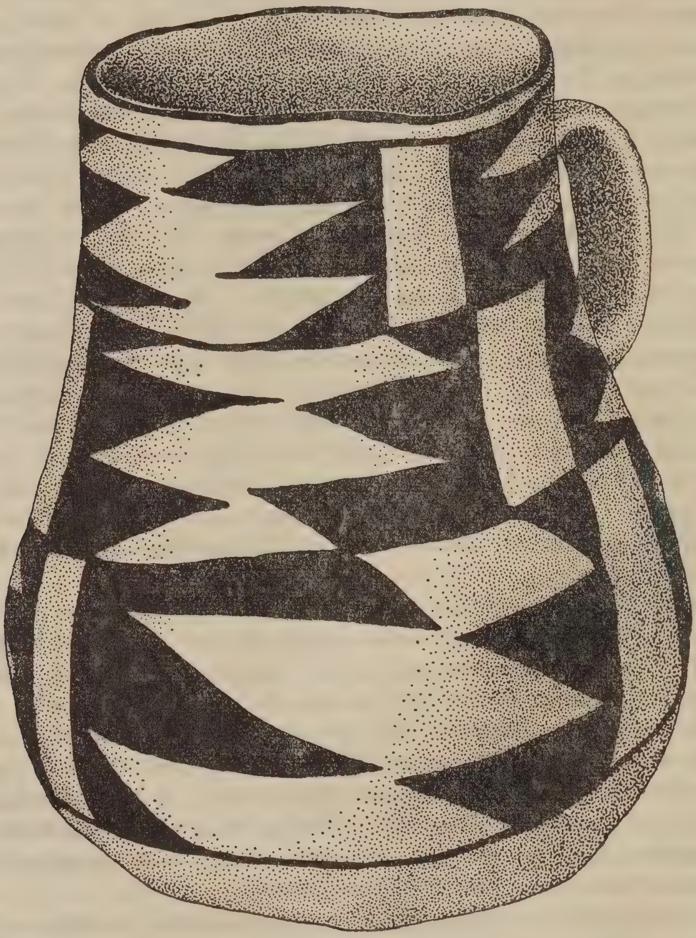

FIGURE 19.—Heavy element type of design from latter part of the Developmental period.

triangles bordered by squiggled hachure, an early combination of the solid and hachure elements. The decoration on *e*, plate 11, is later in the sequence and exhibits fairly well developed characteristics. Around the body of the vessel are two zigzag bands of hachure in which some of the composing lines are squiggled and others are straight. Above these is a band of roughly diamond-shape figures filled with squiggled-hachure lines. This is surmounted by a similar band that does not completely encircle the vessel, while above the latter is another that does. Pendant from the rim is a series of triangular figures with the squiggled lines making the hachure. This vessel is one of the Little Colorado group, the early form, with Chaco influence in the design. Diamond-shaped figures with straight-line hachure were also used in band patterns as illustrated by *c*, plate 14. Most of the straight-lined hachure occurred in fret figures (pl. 14, *e;* pl. 15, *b*, *c*, *e;* pl. 16, *f*); or in meanders (pl. 16 *c*, *d*). In the case of the meanders the hachure was frequently balanced by painting in heavy opposing lines (pl. 15, *d*; pl. 16, *f*). Sometimes a number of different-shaped rectilinear figures were used in making the design as in the case of *d*, plate 16. Filling of the tips of triangular-hachured figures was a common practice at one stage in the Chaco Canyon, but was only sporadic in the Whitewater District (pl. 15, *c*). All of the foregoing examples are characteristic Chaco style hachure. The main criterion for the Chaco style is the use of composing lines that meet the framing lines at an angle. Sometimes the composing lines cut obliquely across the field enclosed by the framing lines, at others they were drawn straight across it. Both forms may be found in a single design.

The Little Colorado or Tularosa hachured designs are characterized by composing lines that run parallel to the framing lines. This has been called longitudinal hachure in contrast to the Chaco oblique hachure.[75] The earliest example of the style in the present series is a pitcher from the initial phase of the Developmental Pueblo period (pl. 16, *e*). The decoration on this vessel is in two bands, one around the body and one around the neck. The design on the body consists of six units separated by sets of vertical, parallel lines. The elements composing the units are solid triangles bordered by series of parallel lines. The triangles fill the lower left and the upper right corners and the bordering lines run parallel to the hypotenuse of each of the triangles with a space between the sets of lines. Due to the curve of the body wall this space is irregularly shaped in most of the units. One unit is incomplete. It contains only the upper triangle and its bordering lines, the lower being omitted. The band around the neck of the pitcher is composed of two rows of opposed hachured and solid figures. One row is pendant from the rim, the other rises vertically from a line drawn around the vessel at the base of the neck. The figures are composed of longitudinal hachure with dotted triangles on either side at the base. A later example of the longitudinal-hachure style of decoration is illustrated by *a*, plate 16. On this vessel there are two similar bands, one around the neck and the other around the body. The chief elements in each are solid fret figures with bordering lines. The units formed by the latter are separated by sets of vertical, parallel lines. Except for the fact that the brushwork in the decoration is rather poor, this is a characteristic form of this design style for the middle to late Developmental period. A typical late Developmental and early Great Pueblo specimen of the Little Colorado or Tularosa type is the balanced solid and hachure decoration on *b*, plate 16. On all of these pitchers, as well as those with the Chaco style of hachure, the handles are ornamented with various figures. On some there are solid frets, on others triangular elements, a few have simple straight lines, others hachured designs. There does not appear to be any close correlation between the style of hachure and the type of handle decoration, nor between the hachure and the painting of the lip of the rim. The latter features seem to have been matters of individual preference rather than in accord with set practices.

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[75] Gladwin, 1931, pp. 21–22.

Dots and checkerboard elements were used through various stages and on different wares. In the Whitewater series there is only one specimen on which the decoration is composed solely of dots. That is the slipper-shaped pitcher (pl. 14, *f*). They were frequently employed in combination with other elements and the bird-shaped vessel (pl. 14, *e*) illustrates that feature. The checkerboard may be simple rectangular figures with alternating solid and open squares or triangular solid and open spaces. Designs formed from these elements occur as simple band patterns as on the neck of *c*, plate 14, in panels as a contrasting motif such as that on the body of *e*, plate 15, or as bands on the neck and body of a vessel as illustrated by *c*, plate 11. Handles were decorated with narrow panels composed of checkerboard elements. By and large, however, the checker patterns were not used on pitchers to the same extent that they were on bowls and ladles. Why this should be the case is not known. During the Great Pueblo stage at other sites in the Anasazi province the checker motif was quite popular on pitchers and it has been considered as one of the characteristic features of the Puerco black on white.[76] Perhaps the Whitewater settlements were a trifle too early to feel the full influence of the vogue.

Decorations on canteens or small water bottles have many of the characteristics noted for those on the large jars and pitchers. There are some differences, however, and the common elements were occasionally combined in such a way that an intricate and unusual pattern was obtained. One of the simplest designs in the entire series is that on the vessel illustrated in figure 20. In this case the two-zone decorational feature was observed with a pattern on the upper part and one around the central portion of the body. Both bands consist of a series of five squiggled lines that make a complete circuit of the canteen. The lower group follows a general horizontal direction around the vessel, but the upper runs rather obliquely around the neck. An interesting feature in the lower set is that the top line is not squiggled where it crosses the perforated-lug handles. On each it cuts straight across at approximately the center of the feature. The lip of the rim is painted with a solid line, although it is slightly broken and thinned in places from abrasion. This particular vessel is a typical early Developmental form of the Chaco series.

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[76] Gladwin, 1931, pp. 22–23.

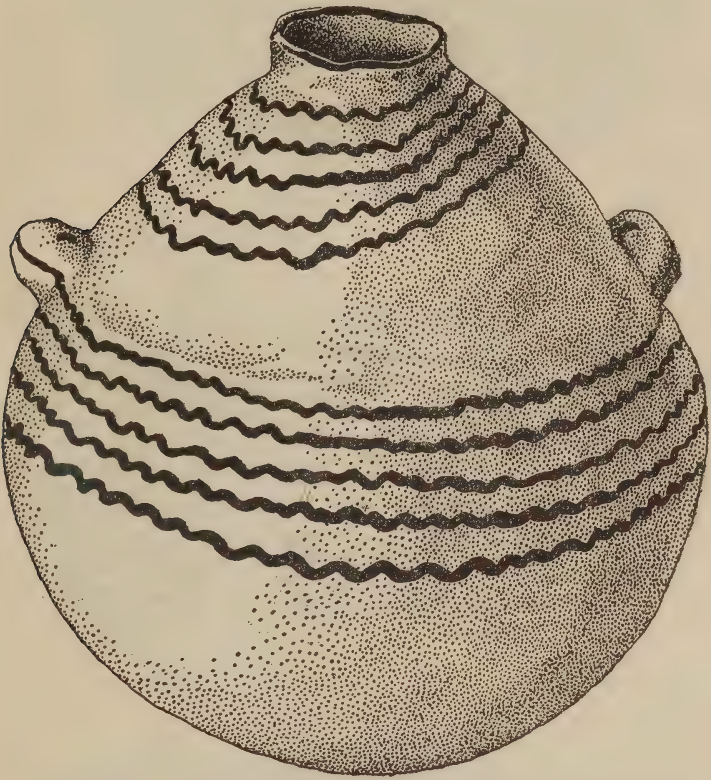


FIGURE 20.—Early style of canteen design, Chaco type series.

Dotted triangles, dotted and ticked lines, and parallel framing lines were as popular on canteens as on some of the forms previously described. A good example of the style of decoration composed of these elements is that on figure 21. The band around the body of this canteen is made up of four units. Each unit is composed of opposed-dotted triangles separated by two parallel, dotted lines. The lower portion of the band is a set of three parallel lines that border the units in characteristic terraced fashion. Around the neck is a heavy ticked line and just below the orifice is a heavy dotted line. The thin lip of the rim on this vessel was not painted. Viewed as a whole this decoration is typical for the Chaco series of early Developmental Pueblo pottery. It is quite similar to some of those already described for the jars and pitchers.

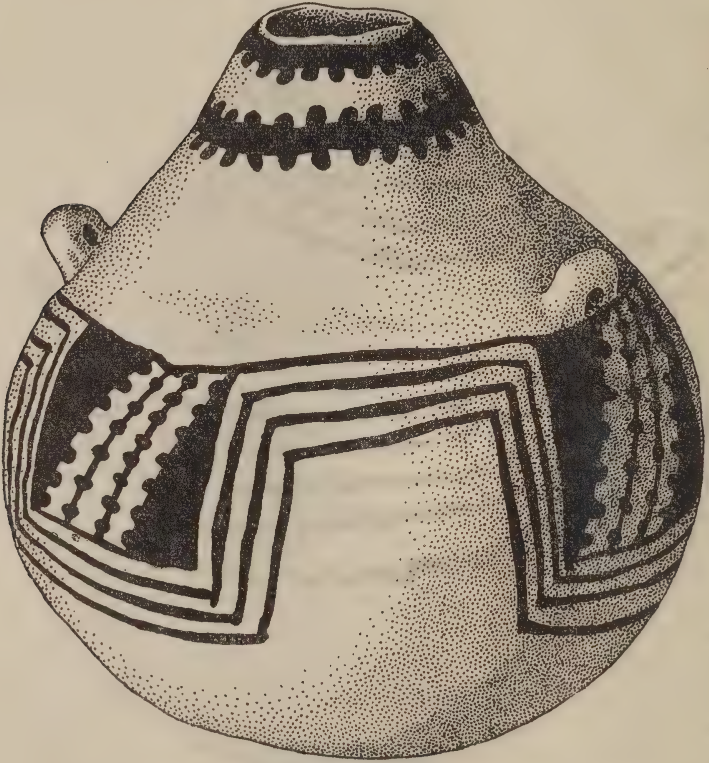
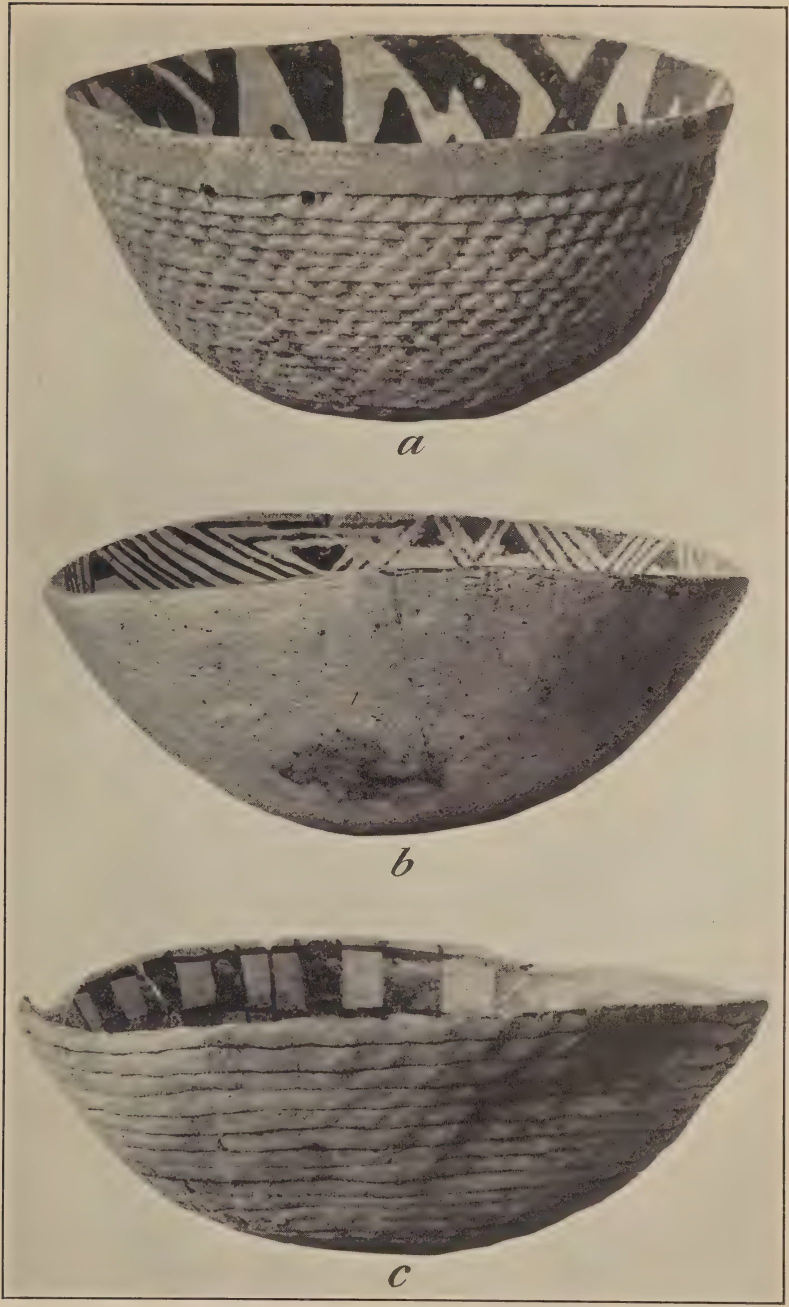
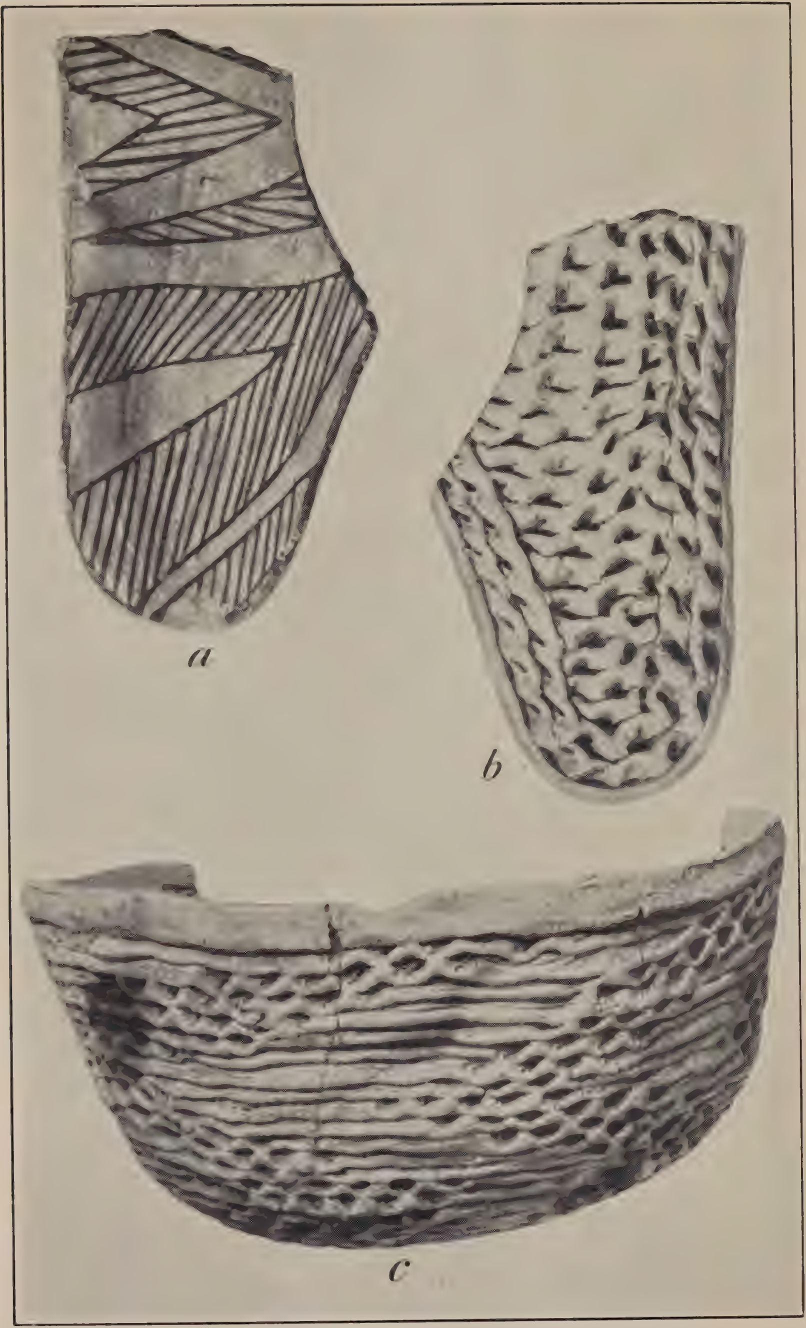


FIGURE 21.—Chaco style of design on canteen.

Tipped or double-tipped triangles used in series and as opposed elements made effective patterns. The canteen (fig. 22) that best illustrates a decoration of this type is one that belongs to the Kana-a black-on-white wares. This particular vessel is typical of that series in all respects. The design covers the upper half of the canteen extending from just below the rim to the area of greatest diameter. The upper and lower borders of the decoration consist of a band of the double-tipped triangles, while the central portion is a band of opposed

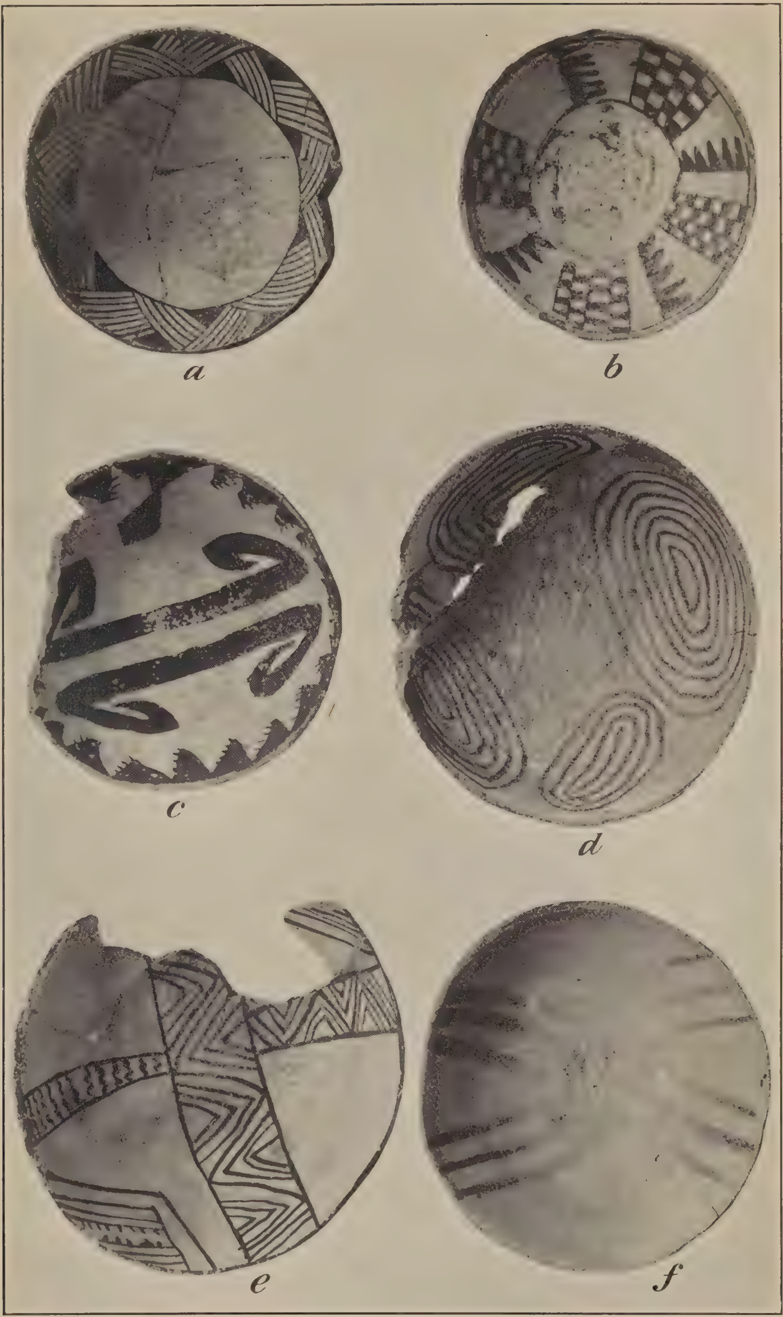


THREE TYPES OF EXTERIOR SURFACE TREATMENT ON BLACK-ON-WHITE BOWLS.

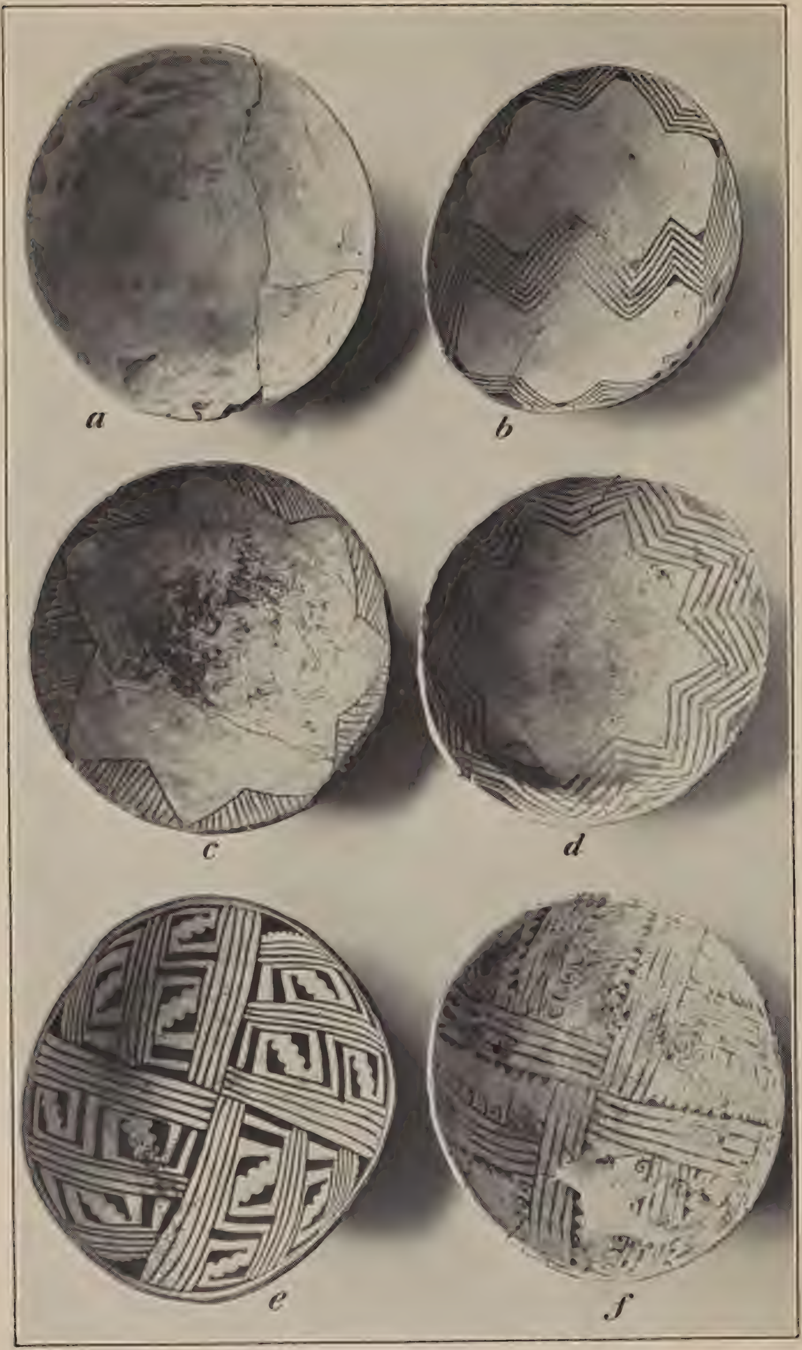


Specimens From Late Developmental Pueblo Phase.

a, *b*, Handle from scoop; *c*, exterior of bowl.



Decorations on Interiors of Bowls.



BOWL DESIGNS.

sets of the same elements. The lower row in this central band makes a complete circuit of the vessel, but the upper one is broken by the vertical lug handles. Where the lower one passed the base ends of the lugs parts of the tips on two of the elements were carried part way up their sides in order to complete the element properly. Sets of double, parallel lines separate the upper and lower bands from the central one. The rim is broken in places and shows considerable abrasion, but it does not seem to have been painted on the lip.

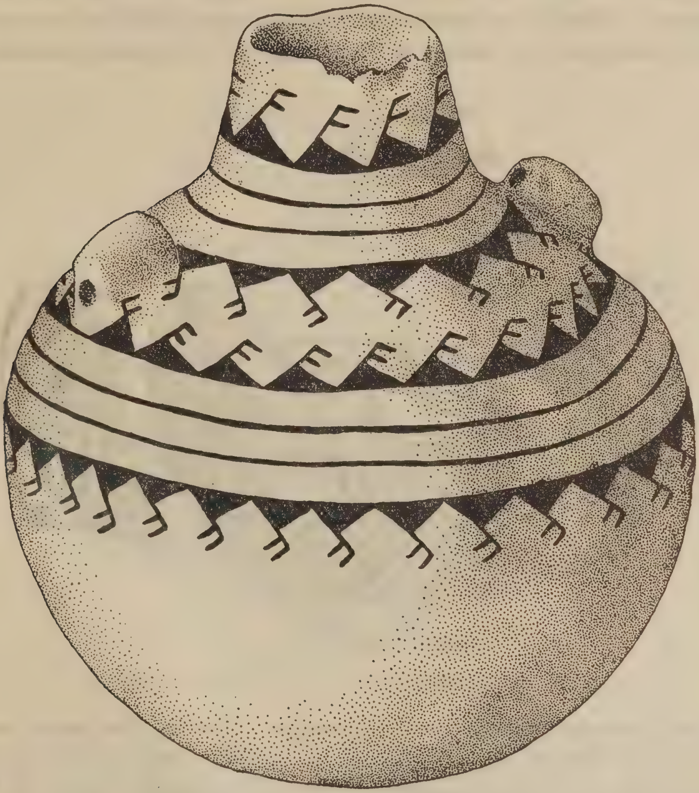


FIGURE 22.—Kana-a style of decoration on canteen.

A complicated and interesting design composed of dotted triangles, opposed-dotted triangles with interlocking volutes, squiggled lines, plain triangles, and parallel-framing lines occurs on one of the canteens. The main part of the decoration is in the form of two panels placed on opposite sides of the body (figs. 23, 24). While producing the same general impression, these panels are definitely different. That on one side (fig. 23) has an upper row of opposed-dotted triangles with interlocking volutes. There are four of these units. The two at the left extend into two panels in the lower row forming figures very suggestive of the so-called seahorse. Where these figures continue in the lower row the dots are omitted. In one of the lower units the opposing element is not dotted, but in the other the dots are present. The latter also has dots along one side of the framing line, put there, no doubt, in an effort to balance those on one of the elements. The central portion of the lower row of the panel has two units, triangular in shape, with squiggled lines cutting across the enclosed area to make a form of hachure. One of the units has the composing lines running obliquely across the area, while the other has an open space in the center framed by squiggled lines on three sides, the lines cutting across the corners, and two pendant triangles on the fourth. Both of these units are bordered by parallel-framing lines. The last unit in the panel balances the first and is composed of two rows of opposed-dotted triangles with interlocking volutes. Due to the curve of the vessel wall this unit is not clear on the drawing of the canteen and is projected at one side so that the irregularities in the pattern are evident. The lower right-hand corner of this last unit has a roughly circular blob of paint that presumably was intended to be a triangle but due to a brush too full of pigment did not attain that form. The panel on the other side has an upper row of four units composed of opposed and dotted triangles with

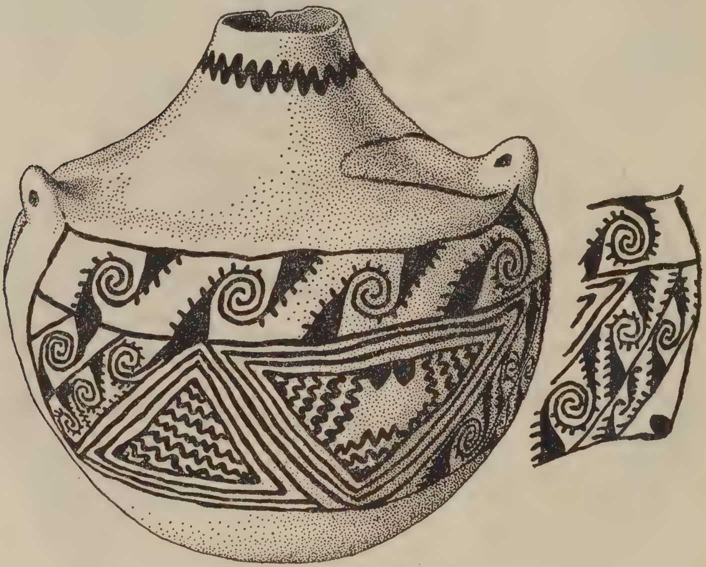


FIGURE 23.—Little Colorado form of canteen decoration.

interlocking volutes that is quite similar to the upper row in the other panel. It differs, however, in that none of the elements extend into the lower row. The bottom part of the panel has five units (fig. 24). The first at the left end consists of opposed-dotted triangles with interlocking volutes in slightly different arrangement from those in the first unit in the other panel. Two of these elements are interesting because they have double instead of single volutes and are not unlike insects with projecting antennae. The central portion of the lower row has three units, instead of two as on the other side, of the triangular form with squiggled hachure. These units are bordered by parallel-framing lines. The last unit in the bottom row of the panel has two of the dotted-triangle elements with interlocking volutes. The lower right-hand corner (see the projection at the side of the vessel, figure 24) is filled with a triangular element of squiggled hachure which is in contrast to the solid blob of paint occupying a similar position in the pattern on the opposite side of the vessel. Around the neck, just below the rim is a heavy line that is a mixture between a squiggled line and a zigzag line. On one side (fig. 23) it appears squiggled, on the other (fig. 24) as a zigzag. When this part of the decoration was drawn a single encircling line was placed on the neck, then a squiggled-zigzag was superimposed on it and the small triangles formed by the latter were filled in, and the figure seen in the illustrations resulted. On the

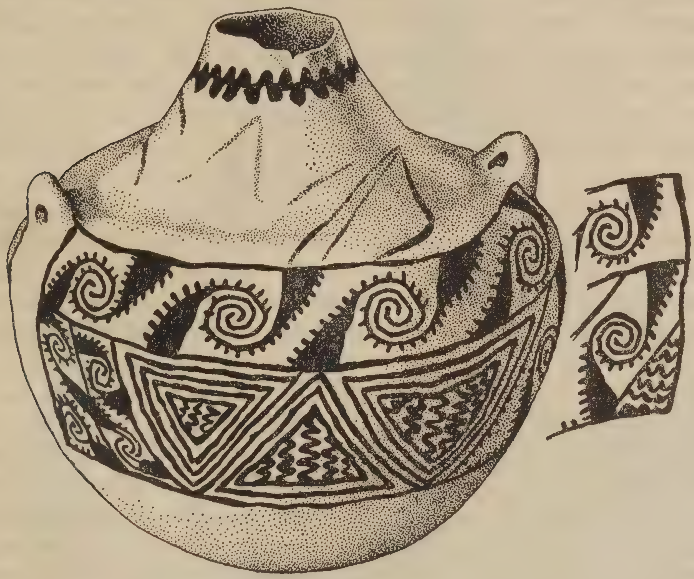


FIGURE 24.—Design on opposite side of canteen illustrated in figure 23.

area between the decoration around the neck and the top of the panels on the body are a number of aimless marks (figs. 23, 24) that seemingly were made by the potter wiping out her brush on the surface of the pot. The canteen with this design is one of the Little Colorado series.

The use of triangular elements with squiggled hachure is illustrated by another canteen of the Little Colorado group. On this vessel there is a band of opposed triangles with squiggled-hachure lines encircling the body (pl. 11, *f*). Each of the rows of triangular figures has a single zigzag-framing line. The open space between takes on the character of a broad, negative zigzag or, as it is sometimes called, a lightning symbol. Pendant from the rim of the orifice (the vessel has no real neck) are six triangles with squiggled-hachure lines. At the lower tip of each of these figures is a curved tip or hook. These are one of the elements considered typical in the designs of the Puerco black on white,[77] as well as in some of the later Little Colorado styles.

Another of the Little Colorado series has a simple, yet effective decoration composed of plain lines drawn in a way to take full advantage of the open spaces. Here, as in the case of a preceding example, the pattern differs on opposite sides of the vessel. The main design consists of a band around the body. The band is composed of four units. Two of these are an elaborate volute (fig. 25) in curvilinear drawing, and two are patterns in rectilinear form (figs. 25, 26). The volutes are essentially the same and do occur on opposite sides of the body; the other units are distinct. One is a chevronlike figure bordered by parallel lines that are attached to the volutes (fig. 25). The other is more involved. The upper portion is composed of a series of open rectangles or negative squares that has the appearance of a folded ribbon, a reputedly typical Little Colorado motif (fig. 26). The lower portion of the pattern is an open zigzag. On the neck are two symbols composed of a cross outlined with two curvilinear-bordering lines. These figures are joined by two parallel lines that suggest a ribbon holding them in position on the neck. The lip of the rim is unpainted. Considered as a whole this decoration is somewhat unusual, yet it does adumbrate some of the later styles in the Little Colorado area.

Checkerboard patterns were occasionally painted on canteens and the vessel *f*, plate 17, is a good example of the simple form with alternating black and white rectangular spaces. The checker motif was applied to the upper half of the vessel, the bottom row of squares coming just below the shoulder. The regularity of the pattern is broken by the loop handles on the upper zone. The potter apparently became confused and in several places, as is seen just below the handle on the right, painted spaces that should have been left open and failed to paint some that required pigment. The lower zone, around the body, has a band of six units separated by series of vertical, parallel lines. The units are composed of three parallel lines that cut obliquely across the field. The direction alternates in each unit so that the series as a whole gives the effect of a continuous zigzag around the vessel. This band may be considered as an example of longitudinal hachure by some, but it does not seem to fall entirely into that category and perhaps may be regarded more properly as a simple variation of the so-called woven type of design. There are a series of cross lines on the handles and the lip of the rim is painted.

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[77] Gladwin, 1931, pls. 15, 16.

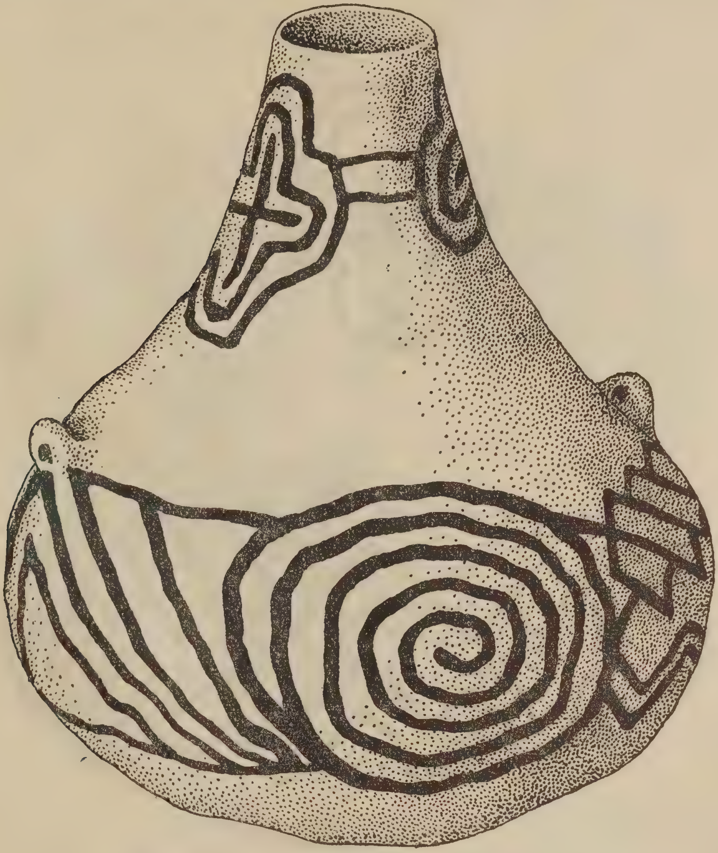

FIGURE 25.—Portion of band design on body of canteen.

Heavy, solid figures composed of triangles and elongated triangles suggestive of pennants or leaves were employed on canteens as well as on jars and pitchers. An effective decoration of this type is that on the vessel illustrated in figures 27 and 28. The design is in the allover style so frequently employed when figures of this kind were drawn. There are five units in the pattern. Those on the sides encompassing the lug handles consist of an open diamond bordered by rows of pennants that are progressively elongated as they approach the top and bottom corners. Extending from the corners on each side are two triangles, the tip of the first is attached to the corner and the apex of the second touches the base of the first. This style of figure is a typical textile form and slight variations of it are common in the patterns on modern rugs and blankets in the Southwest. Whether it was used on textiles during the period when this vessel was made is not known because there are no available woven materials for comparison. It seems likely, though, that such may have been

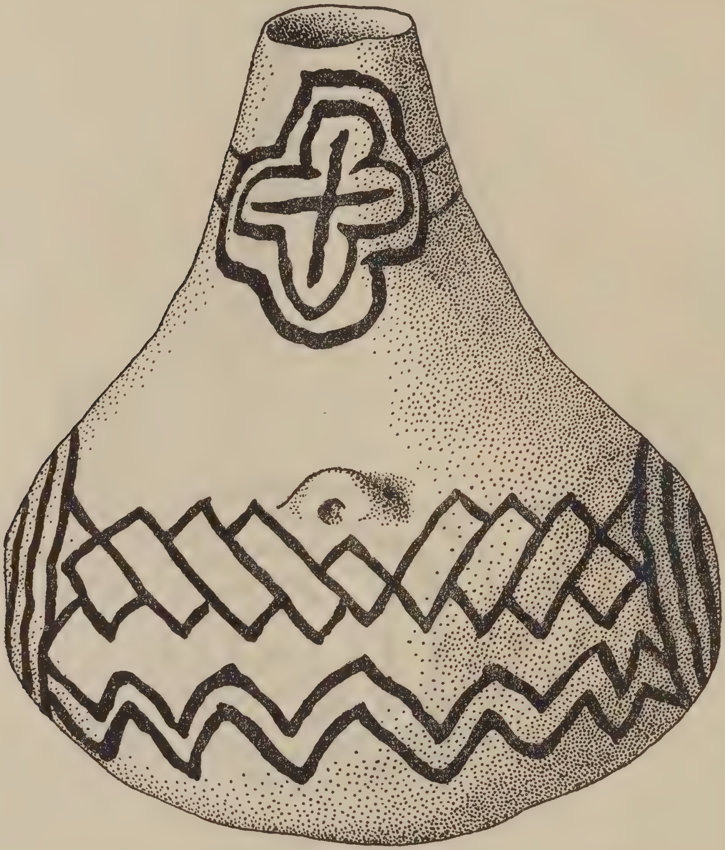

FIGURE 26.—Pattern on opposite side of canteen illustrated in figure 25.

the case. An interesting feature about these two figures is the ticked line cutting across the center of the open diamond and passing through the perforation in the lug handle. These lines suggest sewing and it is possible that they may have been so placed to represent the fastenings of a fabric cover over a water bottle, but it is by no means certain that they were so intended. On the lower part of the body are two chevron-shaped figures composed of a series of the elongated-triangular elements so placed that they are opposed to the elements in the other figures and produce a negative zigzag or lightning symbol. The tip of each solid figure fits nicely into the open space between those in the opposing group (fig. 27). The unit on top of the canteen is similar in a general way to those on the sides. There is an elongated, open diamond in the center that encircles the neck (fig. 28), and the pennant elements are in opposition to the ones in the units on the sides, carrying out the negative zigzag motif. Due to the fact that the canteen itself is slightly asymmetrical and the neck and aperture are somewhat off center, the unit is more irregular in form than the ones on the sides. In addition the placing of the elements was thrown out of balance and some were omitted on one

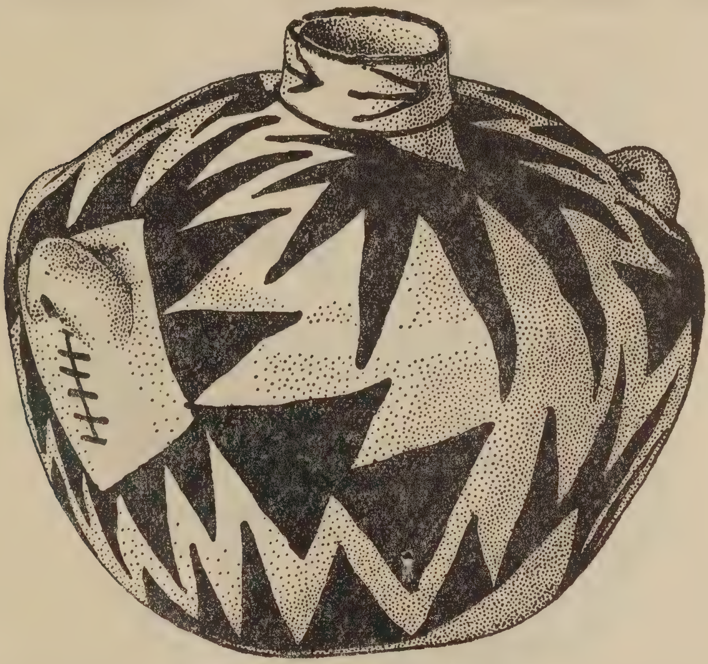

FIGURE 27.—Heavy element style of decoration on canteen from the end of the Developmental Pueblo period.

side. If the elements at the upper corner of the unit on that side of the body had been shorter the potter would have been able to complete the pattern on the top in spite of the difficulty imposed by the position of the neck. Judging from the condition as it exists, it appears that the potter painted the units on the sides of the vessel first and then did the one on the top. A rather unusual feature in the top unit is the negative circle at one end (fig. 28; pl. 17, *c*). Around the neck is a series of the so-called bird-track symbols (fig. 27; pl. 17, *c*). The lip of the rim was also painted. This canteen has all of the characteristics of the Chaco Canyon pottery in its structural features and surface finish. The vessel belongs to the same phase and general group in the Whitewater District as the pitchers with similar decorations (pl. 13, *c*, *d*).

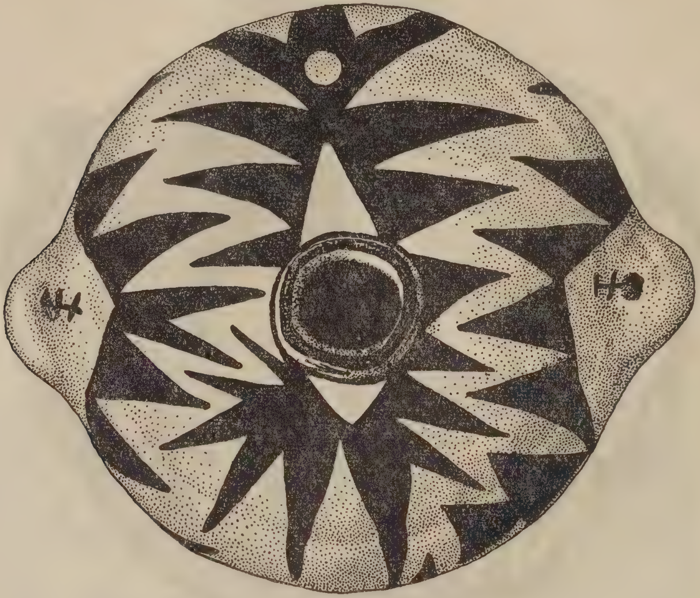

FIGURE 28.—Top view of canteen illustrated in figure 27.

The Chaco-type hachure was used in the designs on canteens as well as on other vessel shapes. In most cases it was in combination with some of the more solid motifs, yet rarely in the form of balanced solid and hachure figures. One example of the group is illustrated in figures 29 and 30. On this vessel the body decoration is a band with six units. The units are composed of opposed triangles and are separated by series of vertical, parallel lines. The top has a meander figure in the Chaco style of hachure (fig. 30). This is the same kind of figure as used on some of the pitchers and large jars, the only difference being that it was painted on a semiflat surface instead of on the curved walls of a vessel. The brushwork in this instance was not as good as that in some of the other hachured designs, but the style is that of the group. Considered as a whole this decoration might be regarded as a combination of Puerco black on white and Chaco black on white, the body band representing the former and the hachured meander the latter. On the other hand it is possible that it is another indication that there is no marked variation between the two groups and that the Puerco series may actually be a peripheral variation of the Chaco pattern rather than a distinct form.

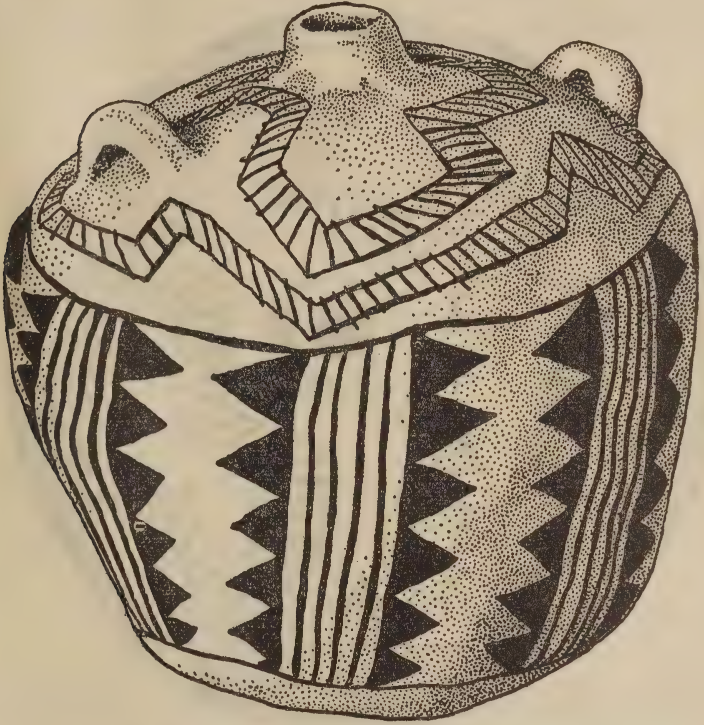

FIGURE 29.—Solid and hachured type of decoration on canteen.

The small number of seed jars in the collection precludes any extensive consideration of the styles of decoration on that shaped vessel. The whole specimens and the fragments indicate, however, that much the same series of patterns appeared on them as on canteens and pitchers. On the globular vessels the ornamentation was usually in the form of a band on the upper half, the lower portion remaining undecorated. The flat-topped forms as a rule had the two-zone treatment, one design around the body, the other on the top and around the orifice. An example of the globular-bodied form is shown in figure 31. On this jar the design is a band composed of rectangular and triangular units. The elements are parallel and squiggled lines. The units are not balanced in the band. There are four rectangular ones and three that are triangular. The four occur in consecutive order, filling about two-thirds of the band, and the three are grouped together around one of the lug handles. The other handle merely projects through the pattern in one of the rectangular units. The decoration as a whole is characteristic of the Little Colorado series of the early Developmental Pueblo black on white. Although different in concept, it is unquestionably of the same design style as that illustrated by the canteen illustrated in figures 25 and 26. The present example is probably a somewhat earlier form.

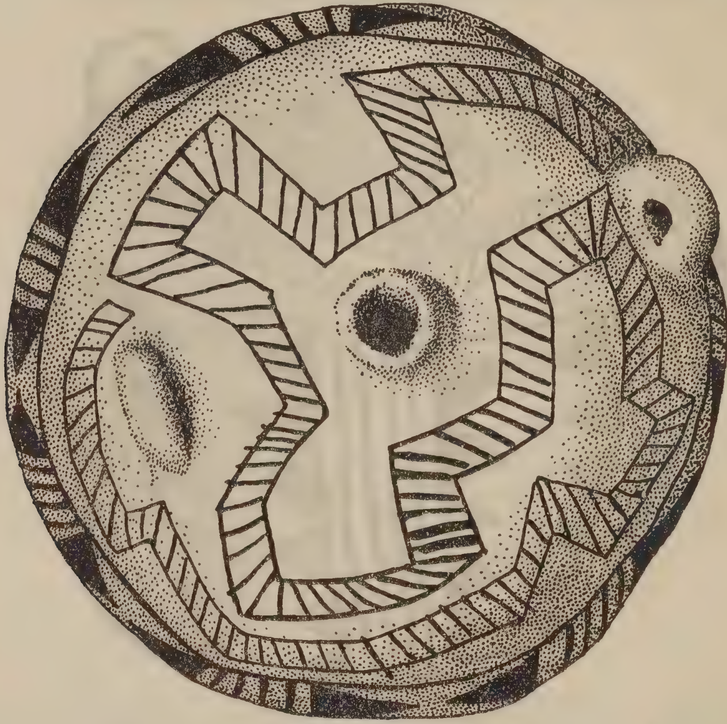

FIGURE 30.—Hachured meander motif on top of vessel illustrated in figure 29.

The flat-topped seed jar illustrated in figure 32 shows the body band and orifice area manner of decoration. The band around the body is one containing four units in which opposed-dotted triangles and parallel lines are the chief elements. The upper left and lower right corners in each are filled with plain triangles, while two rows of the opposed-dotted triangles cut obliquely across the central portions of the unit. These rows of solid elements are separated from the plain triangles and from each other by sets of parallel lines. There are three such series in each unit, the top and central ones being three lines and the lower only two. The units are separated by series of the vertical, parallel lines. There are eight such lines between each unit. This band is similar in many respects to some of those previously described in the consideration of the pitchers and canteens and is characteristically Little Colorado in its motif. The decoration on the upper part of the vessel consists of a series of solid triangles with volutes or hooks. The triangle bases rest on the painted rim of the orifice. Another flat-topped specimen has a series of heavy scroll or S-figures around the body and five plain triangles resting on the rim of the orifice (pl. 17, *e*). The pattern on this vessel is rather common on Little Colorado wares at the end of the Developmental Pueblo and in the early part of the Great period.

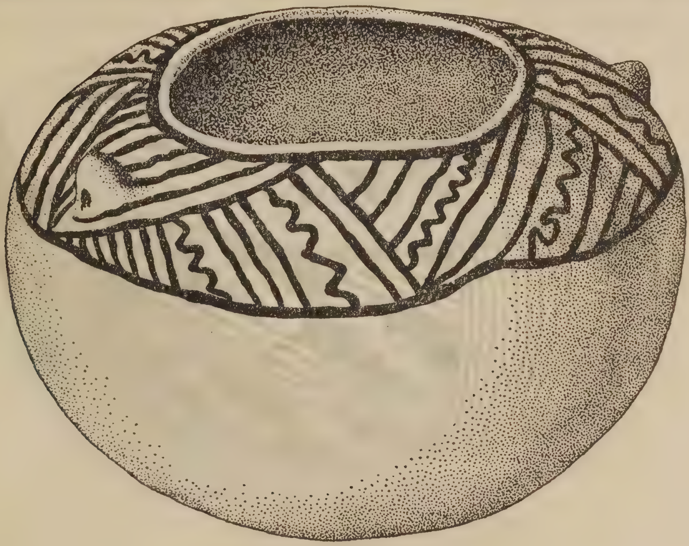

FIGURE 31.—Decoration on seed jar.

The decorations on scoops and ladles are much the same as those appearing on bowls and in the body bands around jars and pitchers. On the scoops or half-gourd forms where the handle is merely an extension of the wall of the bowl, the design is applied in the same way as in the case of a simple bowl. The modified form in which there is a definite delimitation of the bowl through building up the wall for several rows of bands before shaping the handle, the cap-type scoop, has one pattern in the bowl and another in the handle, or a similar yet separate unit of the design in the bowl. The same pattern rarely continues from the bowl into this form of handle. The bowl and handle ladles have complete decorations in the bowl and different patterns on the handle. Occasionally the same motif may appear in both, but the two are usually distinct. As a matter of fact ladle handles are ornamented in much the same fashion as the handles on pitchers. The bowl designs, regardless of the type of scoop or ladle, occur as allover patterns, as panels pendant from the rim, as panels bisecting the field for decoration, as simple bands, and as stepped or pendant figures bordered by sets of parallel framing lines. The elements are similar to those used in the ornamentation on other classes of vessels. One of the scoops in the collection has a pattern consisting of three squiggled lines running around the wall of the bowl and extending along the handle (pl. 18, *c*). When this design was drawn three straight, approximately parallel and equidistant, lines were placed on the object to serve as a guide and then the three squiggled lines were painted over them. This feature shows clearly in the photograph. The lines do not form a complete band. The upper two do not meet at the end of the handle. The lower one does in a V-shape but is not what might be considered a continuous line. The bottom of the bowl is undecorated. The lip of the rim is painted black, the line forming a border for the entire design. Decorations of this style are common on the half-gourd scoops and are a character-

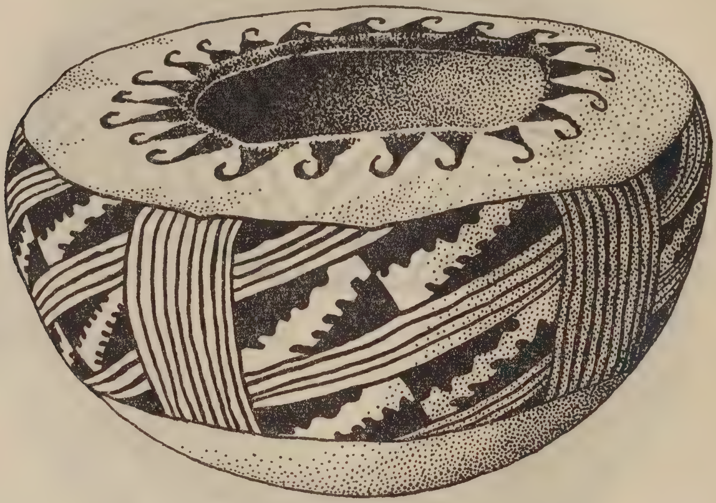

FIGURE 32.—Design on seed jar.

istic Chaco feature on this class of vessel as well as on other forms. This particular specimen is a good example of the Chaco wares in all of its traits.

One of the simple ovoid-shaped scoops has a design consisting of panels extending from the rim on the bowl end to the rim on the handle end (fig. 33). On either side just below the rim are sets of three squiggled lines. Below these are rows of tipped triangles that take on the form of opposed triangles when the pattern is considered as a whole. They do not exhibit the usual character of opposed triangles, however, in that they have their tips pointing in the same direction. The potter appears to have been undecided whether to make rectilinear tips or volutes at the ends of the triangles. The latter are also poorly drawn, yet the general effect of the design is good. There is no bordering line for the pattern as the lip of the rim is not painted. Tipped triangles and squiggled lines were also used as the chief elements in the design on one of the cap-type scoops. The major part of the decoration is in the bowl (fig. 34) and is of the band variety. There are five units in the band. Owing to the curve of the wall of the bowl, the units are wedge-shaped, narrower at the bottom than at the top, and some of the lines have a pronounced slant. Each unit consists of a set of three, approximately parallel, squiggled lines and a row of double-tipped triangles. The units are separated by single, vertical lines. The line forming the lower border for the band also makes a crude circle in the bottom of the bowl. The pattern in the handle has two units separated by a single median line. The elements in the units are scrolls, or volutes, and zigzag lines. The units are different in that one has three of the volutes, the other four

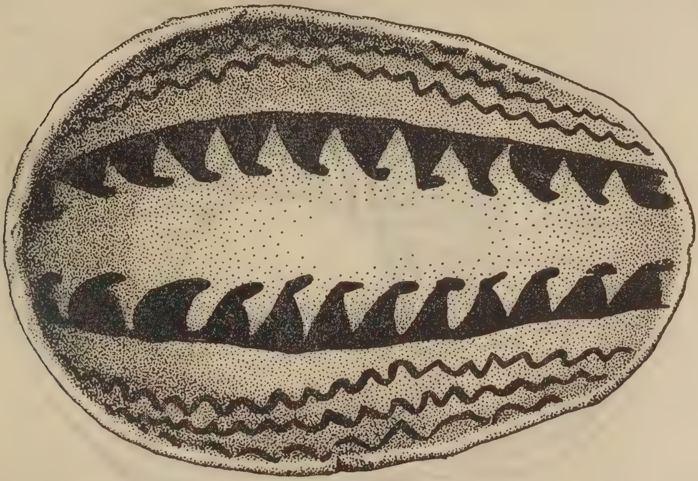

FIGURE 33.—Decoration on interior of scoop.

in a variant placement, and one has three of the zigzag lines while there is only one in the other. There is no bordering rim line for this design, but similarly shaped scoops with decorations in the same style do have that feature. Hence the omission seems to be one of individual choice rather than a definite trait for the series. Most of the cap-type scoops are ornamented with designs in this light, rather lacelike style, so that it seems permissible to conclude that there is a correlation between the two. These scoops are part of the Little Colorado series of the early Developmental Pueblo group and there is an affinity between their patterns and some of those on the pitchers and canteens of the same ware. There is a certain suggestion of Modified Basket Maker influence that belies their position in the ceramic sequence. It may be the result of a persistence in the peripheral lag in centers slightly west and south of the Whitewater District having an effect on the products in the latter.

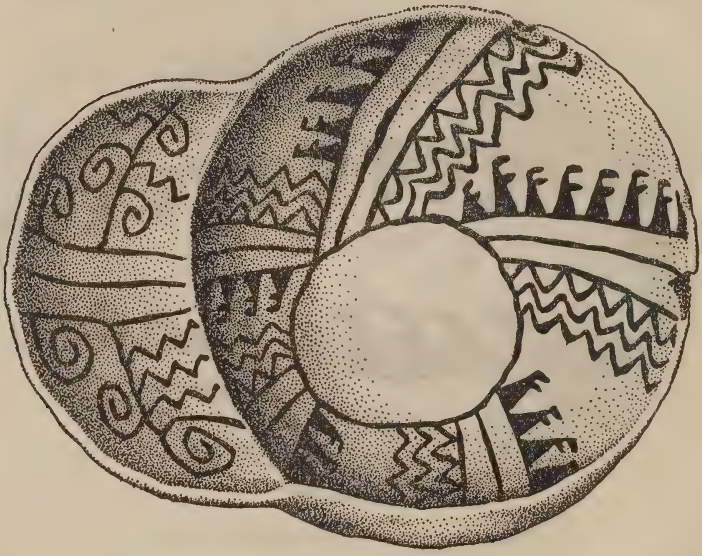

FIGURE 34.—Design on interior of cap-type scoop.

A simple band design composed of opposed-dotted triangles and parallel lines separating the units in the decoration is common on scoops of the half-gourd shape (fig. 35). On most specimens where this motif was used the lip of the rim is painted forming an enclosing line for the entire pattern. Band patterns were also made up from the regular checkerboard element, but they occur more frequently on the bowl and handle shape than on the half-gourd. In many cases some form of hachure appears in the decorations. On the early specimens the squiggled style prevails, while on later examples the straight-line form was that used. The scoop handle with indented corrugation on the exterior (pl. 22, *b*) has a hachured design on the interior (pl. 22, *a*) that is characteristic of the advanced style of hachure pattern. A few of the scoops and ladles have an additional figure in the bottom of the bowl. These are similar to figures used on the regular bowls and consist of a simple cross, an open circle, a triangular element, or an occasional simple line representation of a human or animal figure.

The designs on the bowls are composed of the same kinds of elements as those on the vessels described in preceding paragraphs. The area of decoration, the concave inner surface of the bowl, was treated in various ways. On some there is a single pattern occupying a major portion of the circular field. On others there is a series of panels cutting across the bowl from rim to rim. The number varies from one to three, or in rare cases even more. Some have a quadrant treatment obtained from the preceding pattern by passing a second panel, single line or series of lines across the field at right angles to the original bisecting figure. In this group there are frequently additional figures in the segments formed by the cross panels. Another quadrate pattern has four panels meeting at the center and the sectors forming units in an allover decoration. A rather popular plan of ornamentation consisted of figures pendant from the rim but not crossing the center of the bowl. This group includes panels placed at opposite sides, either two or four, as balanced figures and sets of three spaced at approximately equal intervals around the wall. These units are either quadrangular, triangular or curvilinear in form, meet the rim at right angles or cut obliquely across the side of the bowl. Sets of figures, usually two or four, placed on opposite sides some distance below the rim constitute another arrangement. In rare cases there are five figures in such a design. One of the major groups of patterns is that of

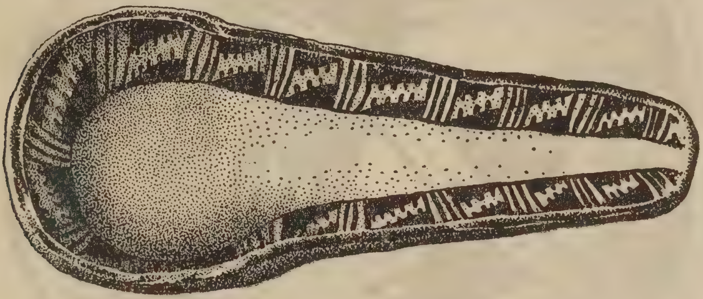

FIGURE 35.—Decoration on half-gourd style of scoop.

the encircling-band style. In this series the band may be just below the rim, midway down the wall of the vessel, or virtually encircling the bottom. The upper and lower framing lines of the band may be regular and continuous or of the zigzag or stepped variety. Occasionally there is an allover decoration and there are variations and combinations of the different styles just mentioned. Only a few specimens have decorations on the outside as well as the inside and where those occur the pattern conforms to one of the styles found on the interior.

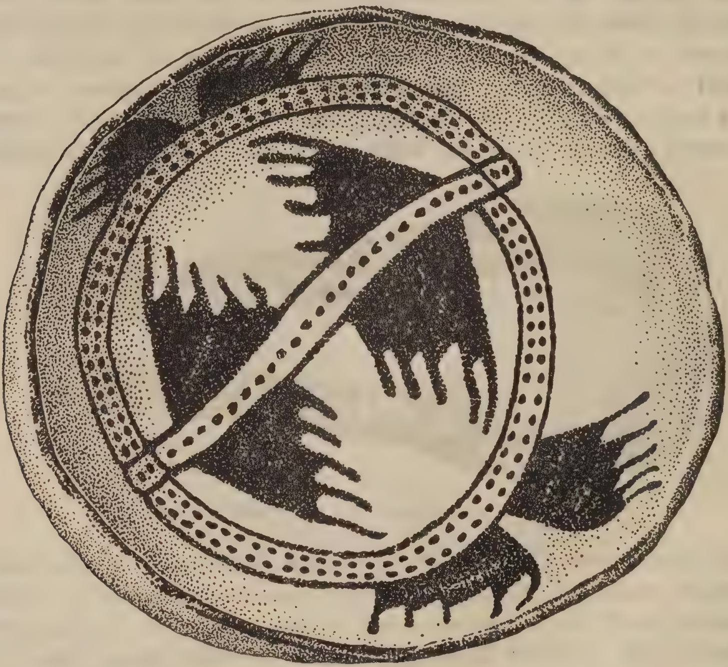

FIGURE 36.—Design on interior of late Modified Basket Maker bowl.

An example of the central-pattern style of decoration is shown by one of the Modified Basket Maker bowls (fig. 36). The main portion of this design is on the bottom of the vessel and only the attached elements on the two sides extend up the walls. The basic elements in the pattern are dots with bordering lines and solid-terraced figures with projecting tips. The latter are somewhat suggestive of a formalized wing and are sometimes called a bird-wing symbol. Both the solid figures and the framed dots are typical Modified Basket Maker elements, but the manner in which they were used and the general appearance of this particular pattern is somewhat unusual for that period. As previously stated, however, this vessel is late in the series, and may well have been made at the very end of the Modified Basket Maker phase and for that reason have a more advanced decoration. The rim of the bowl is painted furnishing a frame for the design.

An elaborate form of the design type consisting of panels crossing the bowl from rim to rim occurs on one of the early Developmental Pueblo vessels in the Chaco I series (fig. 37). There are three main panels in this pattern with figures separating the panels and figures pendant from the rim bordering them on the two sides. One panel cuts across the center of the bowl, the other two are placed so that they are midway on the sides of the vessel. The basic elements in the panels are solid-terraced figures with projecting lines arranged in opposing rows. The figures separating the panels are lines with rows of alternately placed triangles, a motif that developed out of the straight line with overlying-zigzag style of drawing. The bordering units pendant from the rim are simple dotted triangles. The rim of the bowl is painted to form a border for the decoration.

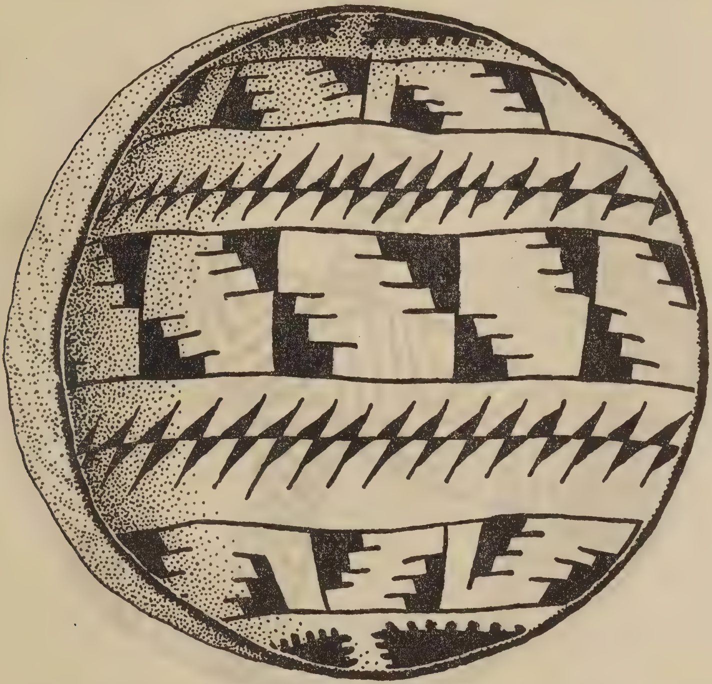

FIGURE 37.—Pattern on early Developmental bowl of the Chaco-type series.

The simplest design of the four-segment style in the series is one in which three heavy, parallel lines cut across the center of the bowl as a continuous panel and two additional sets extend from the rim to the center where they join the outer lines of the first panel (pl. 23, *f*). The secondary sets of lines were drawn obliquely from the center to the rim and as a consequence the segments are not of equal size. Two are small and two are large. The open spaces left between the sets of lines were not filled with additional figures. The rim of the bowl was painted but due to abrasion of the lip is no longer clear or continuous. A better and more elaborate example of this same style of decoration is shown by another bowl, rather a portion of a bowl as some of the vessel is missing (fig. 38). Here the secondary panels meet the main one at approximate right angles and the field for decoration is quartered. The continuous panel through the center is composed of parallel-line elements arranged to make a series of alternate chevrons. Actually, the design was made by drawing the central zigzag line and then filling in the triangular spaces between it and the borders with shorter, chevronlike lines. One of the secondary panels is in the same motif, but the other is in the squiggled hachure. Two of the quarter segments have pendant-triangular units composed of opposed-dotted lines and parallel lines. Part of one unit is missing,

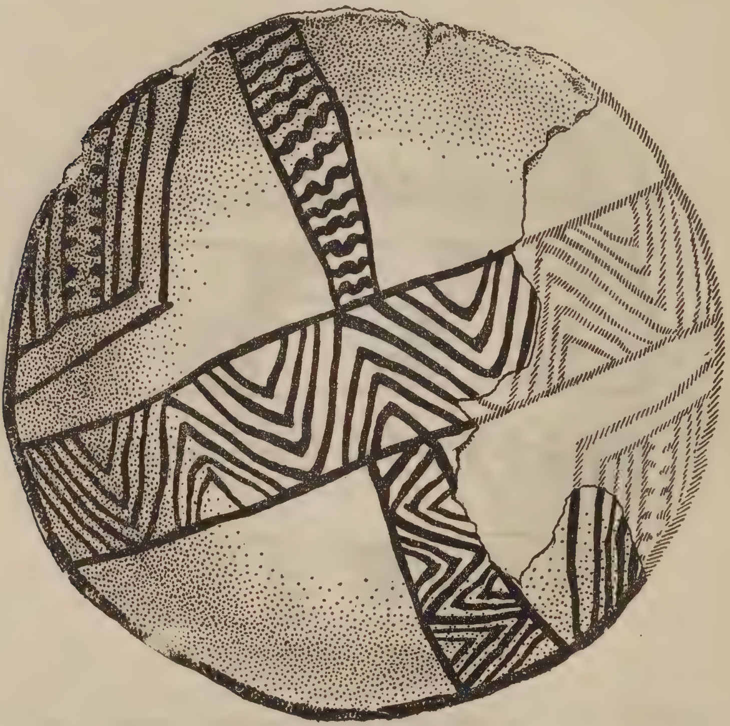

FIGURE 38.—Quartered design in early Developmental Pueblo bowl.

but sufficient fragments from that portion of the bowl show that the decoration was the same as on the other side. The rim of the bowl was also painted. The vessel belongs to the initial phase of the Developmental Pueblo. It is one of the Chaco series, yet in some respects is suggestive of the Little Colorado forms and is also slightly reminiscent of the Modified Basket Maker. Perhaps it should be considered an example of an early blend in influences from two patterns and features from two cultural horizons. Similar bowls from other districts have been classified as Modified Basket Maker. When all of the traits are considered, however, such a dating does not seem to be warranted.

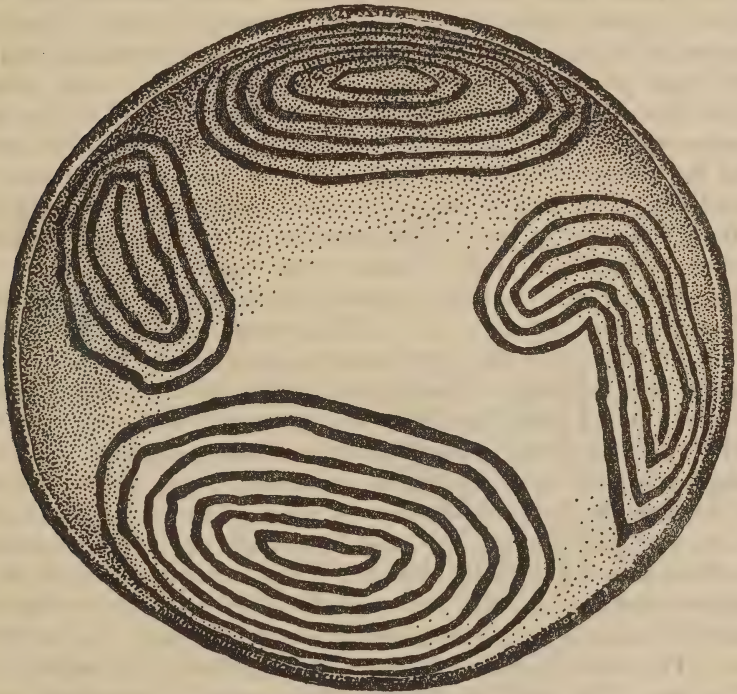

FIGURE 39.—Concentric figures on interior of Developmental Pueblo bowl.

The style of design in which separate figures are placed on the walls of the bowls some distance below the rim has a number of forms. One example has four units placed on opposite sides. Two of the units consist of concentric ellipses and two of concentric ellipses with a line at the center (fig. 39). Similar units are placed on opposite sides. One of the concentric-elliptical figures has six and the other seven ellipses. The two other units have three ellipses each and the central bar. One of these figures is not truly elliptical in form, however, as the potter made it too large and in order to fit it into the available space bent one end downward. If the unit had been painted the same size as the similar one on the opposite side there would have been ample room for it. This style of pattern is rather common in the Piedra and neighboring districts in southern Colorado and is observed on occasional specimens from the Chaco Canyon area. Its greatest vogue was on vessels of the beginning stage of the Developmental Pueblo period. A few specimens with concentric circles or concentric ellipses belonging to the closing stage of the Modified Basket Maker have been reported from various sections, but the pattern is more characteristic of the following horizon. Another illustration of this general style occurs on a bowl belonging to the later stage of the Developmental period, to the Escavada group of the Chaco series. The vessel has a pattern composed of five triangular-scroll figures (pl. 25, *e*). Four of these figures would have filled the space nicely. Crowding in the fifth made it necessary to extend one of the figures so that its lower half partially covers the bottom of the bowl. Most of the examples in this general style have an open space at the bottom or center of the design.

Designs formed from figures pendant from the rim are numerous in the collection. On most of the Whitewater specimens the figures are of the triangular form and occur in sets of three or four. The elements used in most of the patterns are the solid triangles, dotted triangles, dotted lines, parallel lines and squiggled hachure. One bowl with three of the pendant figures has units composed of dotted triangles, opposed-dotted triangles separated by sets of dotted lines and rectangular-fret lines connecting some of the dotted triangles (pl. 25, *b*). The units are connected by a single line that is an extension from some of the solid elements. This treatment seems to be a variation or development of the parallel-stepped framing line feature present in some of the contemporary designs with quite similar style units. The pattern as a whole has a framing line in the painted lip of the rim. This bowl fits into the Chaco series so completely that no questions would be raised if it was found in a Chaco Canyon ruin. It belongs to the Transitional group or the Red Mesa black on white. The bowls with four pendant figures have units composed of various elements. One example has opposed triangles bordered by parallel lines. The opposed triangles form a panel cutting obliquely across the center of each unit and the parallel lines serve as a frame (pl. 25, *a*). On three of the units three parallel lines occur along the bottom of the panel and four above. The fourth unit reverses the order with three above and four below. The narrow end of each unit just touches the broad end of the adjacent one so that the inner line is continuous and forms a negative pattern in the bottom of the bowl.

The rim has a painted lip to frame the pattern. A design of this nature would also be strictly at home in a series of Chaco Canyon pottery, but this particular vessel belongs in the Little Colorado group on the basis of its other characteristics. A different form of decoration composed of four pendant units is illustrated in figure 40.

On this vessel the figures are approximately of the isosceles-triangular shape rather than the right-triangular as in the preceding examples. The elements in the units are solid triangles placed at one corner, two panels of the squiggled hachure separated by parallel lines, and parallel lines along one border. In three of the units the corner triangles are separated from the squiggled hachure by two parallel lines, but in the fourth they are omitted. This unit also has only two lines between the hachured panels while the others have three. There are four bordering lines, including the other framing line of the unit, along the second hachured panel in this and the opposite figure. The other two have but three. The continuous bottom line forms a negative, four-pointed star in the bottom of the bowl. The rim was painted originally, but the pigment has been rubbed off and only shows in places. This bowl is another one of the Chaco series. The

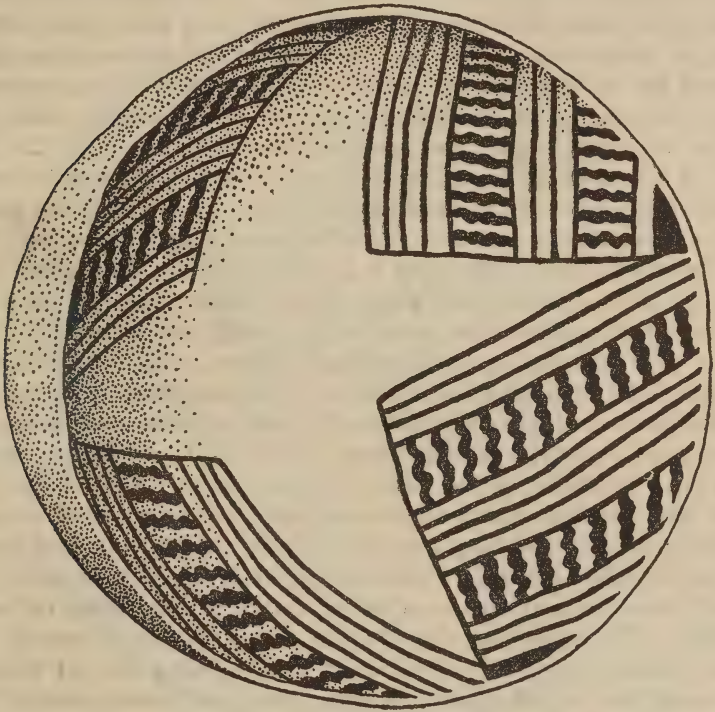

FIGURE 40.—Triangular units in decoration on bowl of the Chaco series.

negative feature in designs of this type has been considered as one of the typical traits of the Puerco black on white,[78] yet it is so common on vessels of the early Developmental and Middle Developmental Pueblo series in the Chaco pattern that it, like some other traits, may be too widespread to have particular cultural significance. On the other hand it is possible that it represents additional Chaco influence in this region.

The quadrate type of decoration in an allover pattern is consistent in its feature of the four units meeting near the center of the field for decoration at the bottom of the bowl. The composition of the units shows considerable variation, however, and there were differences in the elements chosen for the motif by the potters when they painted the designs. One example has units made up from opposed-dotted triangles with interlocking, yet continuous volutes, solid triangles, tipped triangles, and parallel bordering lines (pl. 25, *d*). Two of the units have panels of the opposed-dotted triangles with interlocking and continuous volutes, and two of them have one panel each of the same motif and one of opposed-tipped triangles. At one corner in each of the units is a solid triangle. The number of parallel lines separating the panel figures varies from unit to unit. The complete pattern was enclosed by a solid line painted on the lip of the rim. The use of squiggled hachure, solid triangles, and the parallel bordering lines in this style of decoration is illustrated by the portion of a bowl (pl. 25, *c*). Both of these specimens are Chaco-type pottery. Another form of this style of design occurs on a bowl belonging to the Little Colorado series. In this case the main elements used in the units are tipped triangles, small volutes or hooks and parallel lines (fig. 41). Each unit has a central panel of parallel lines, a series of three, bordered on one side by a row of tipped triangles and on the other by a row of the volute or hook symbols. The inner framing line of each unit has a row of the tipped triangles opposite the row of volutes and a row of volutes balancing the row of tipped triangles. The units are separated by sets of parallel lines occurring in threes. The lip of the rim on this vessel was not painted. The use of solid elements and parallel lines in a quartered pattern is shown by a bowl of the Escavada black on white in the Chaco series (pl. 24, *e*). In this design each unit has two main panels composed of heavy rectangles from which project lines supporting opposed-dotted triangles. One panel in each unit has two of these figures and the other panel one. The panels are separated by sets of parallel lines, two in every instance. One corner in each unit has a dotted triangle separated from the smaller panel by parallel lines. There are three of these lines in three of the units and two in the other. The rim of the bowl was painted to supply a framing line for the entire pattern.

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[78] Gladwin, 1931, p. 19.

Band designs have numerous variations and are composed of different combinations of all of the elements noted in other styles of decoration. One simple form consists of a series of solid triangles pendant from the rim and bordered by a series of parallel lines that make a zigzag lower border (pl. 24, *d*; pl. 27, *e*, *f*). The number of triangles varies from bowl to bowl, there are 9 on the first example, 22 on the second, and 8 on the third. This is governed somewhat by the size of the bowl and the size of the triangles, as well as by the question of whether the triangles are in juxtaposition or have intervening spaces. The number of the bordering lines also differs from bowl to bowl. The three that are illustrated have six, four and five. Some specimens have more, others less. This style of decoration is one that started toward the end of the Modified Basket Maker stage and persisted through the Developmental Pueblo into the early part of the Great Pueblo. It appears on many types of the black-

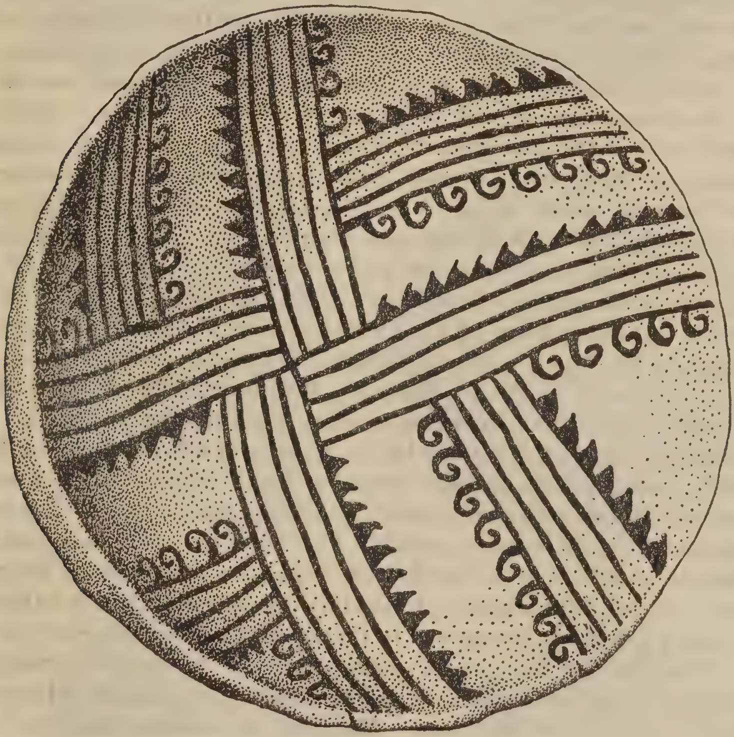

FIGURE 41.—Quartered style of decoration on early Developmental bowl.

on-white wares and has little value as a criterion for horizon or culture. In the present series two belong in the Escavada black on white of the Chaco group (pl. 27, *e*, *f*) and the other to the Little Colorado (pl. 24, *d*). The first two have painted rims, the last one does not.

Variations of the pendant-triangle style of design are illustrated by the bowl *c*, plate 24, and *d*, plate 27. On the first is a series of seven hachured triangles. The second is more complex. There are eight triangular units with zigzag lines forming the lower border. The triangular units are composed of a heavy scalloped line along the base, the rim of the bowl, opposed by a scalloped triangle in the apex. The potter apparently became confused in her drawing of the lower zigzag lines because there are three for about two-thirds of the circumference and only two for the remainder. Both of these bowls have the painted lip on the rim. The first example belongs in the Little Colorado group and the second is another of the Chaco Escavada series. A combination pattern in which a pendant-triangle style of band was used with a zigzag panel cutting across the center of the bowl occurs on one of the Chaco I vessels (pl. 24, *b*). Slight modifications and variations of this pattern are characteristic for the beginning stage of the Developmental Pueblo in all districts subject to the Chaco cultural pattern. Examples were found at the Long H Ranch southwest from the Whitewater District[79] and in collections from the Chaco Canyon and southwestern Colorado.

Plain bands, that is those with an upper and a lower framing line, exhibit many of the features noted in bands around the bodies of pitchers. Similar elements were used in drawing them and they were combined to make the same motifs. One form of band is composed of elements like those in the bowls with zigzag lower borders on the patterns. It has solid triangles framed by parallel lines, but is balanced because a lower row is opposed to those pendant from the rim (pl. 23, *a*). The parallel lines do not zigzag between the opposed triangles. They have the folded fabric or woven effect that is considered typical of the Puerco black on white. The bowl in question, however, is a Chaco I in all other traits. Opposed triangles, terraced figures, parallel-stepped lines and vertical lines were used in some of the bands. A good example of this is on one of the bowls of the Little Colorado series that seemingly has a Kana-a derivation (pl. 24 *a*, fig. 42). The pigment on this specimen is so faded that it does not show well in the photograph. The drawing, however, brings out all its features. The design is a balanced one containing four units. Two of the units have double panels of opposed triangles that produce a negative zigzag

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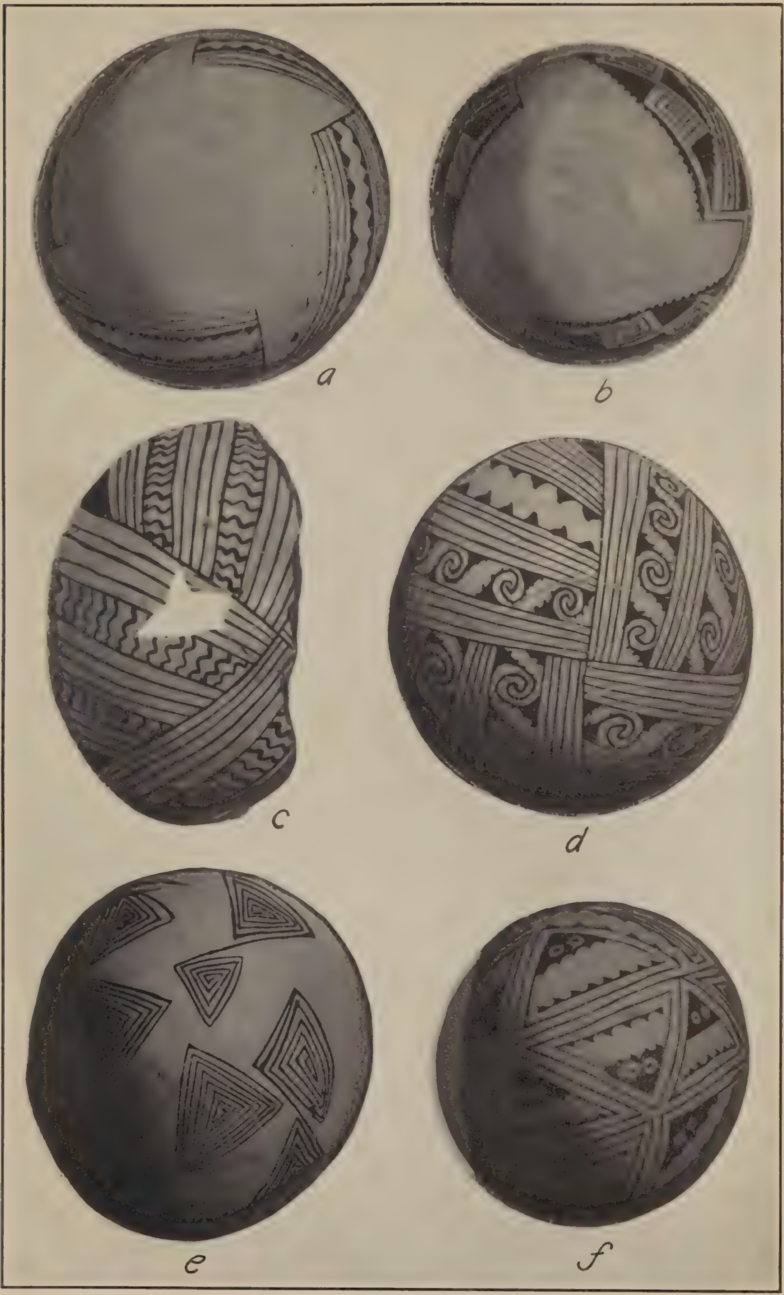
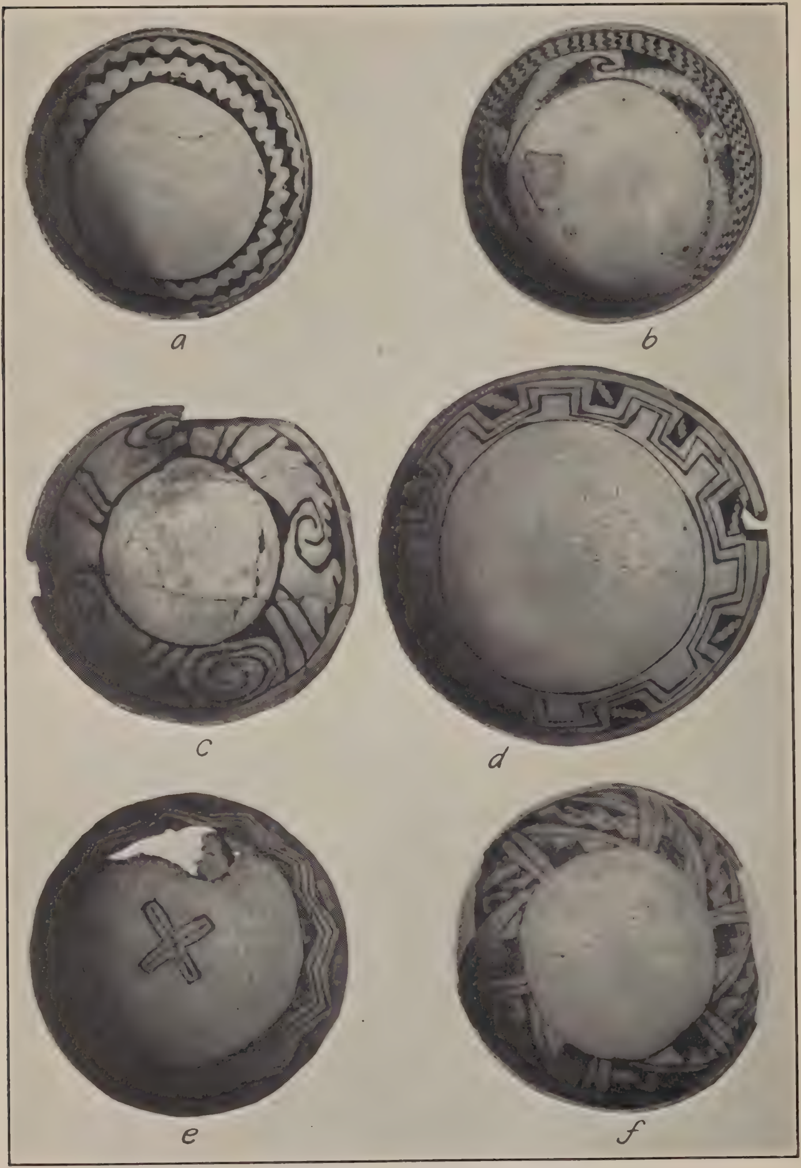
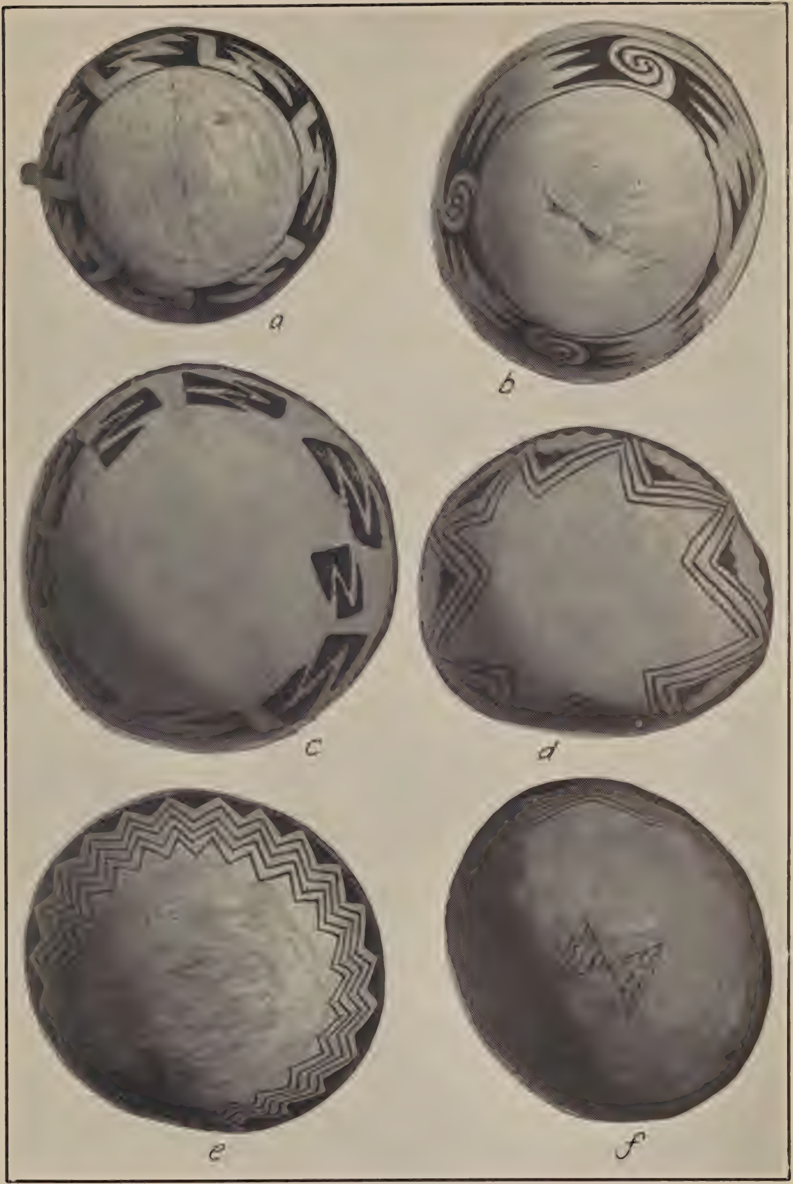
[79] Roberts, 1931 b, fig. 21, *b*.



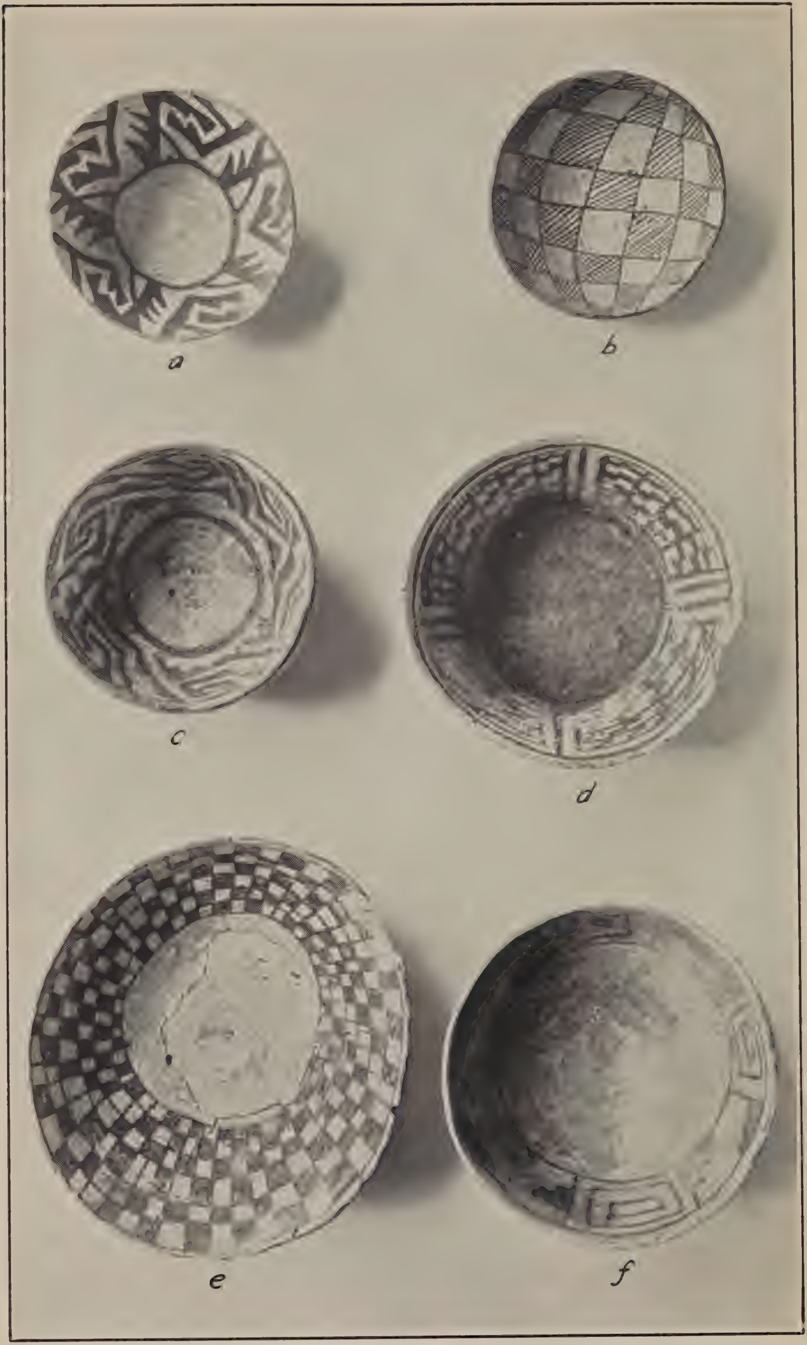
Black-on-White Bowl Interiors.



Band Designs on Interior of Bowls.



Black-on-White Ware Bowls.



DIFFERENT STYLES OF BOWL DECORATION.

or lightning symbol, and two have double-triangle figures with framing parallel-stepped lines and terraced corner elements. The units are separated by single vertical lines. The Kana-a type bowls have designs that are somewhat in this style, but make use of the double-tipped triangles, dotted triangles, dotted lines, as well as the plain triangles and stepped lines. A typical example is that on *f*, plate 26. There are six similar units in this band. Each unit has a central panel cutting obliquely across the field, the motif of which is opposed double-tipped triangles. The lower left and upper right-hand corners have double-tipped terraced elements that are separated from the panels by a single straight line. The rim of the bowl was not painted. A more elaborate band design is that from another Kana-a bowl. There are four units in the pattern (fig. 43). Two of them are composed of solid triangles, dotted lines, and parallel-zigzag lines. These elements are arranged so that the corners are filled with rows of opposed triangles separated by double-zigzag lines. These figures are separated by dotted lines that cut obliquely across the unit. The base of the row of triangles is dotted to correspond to the lines. There are

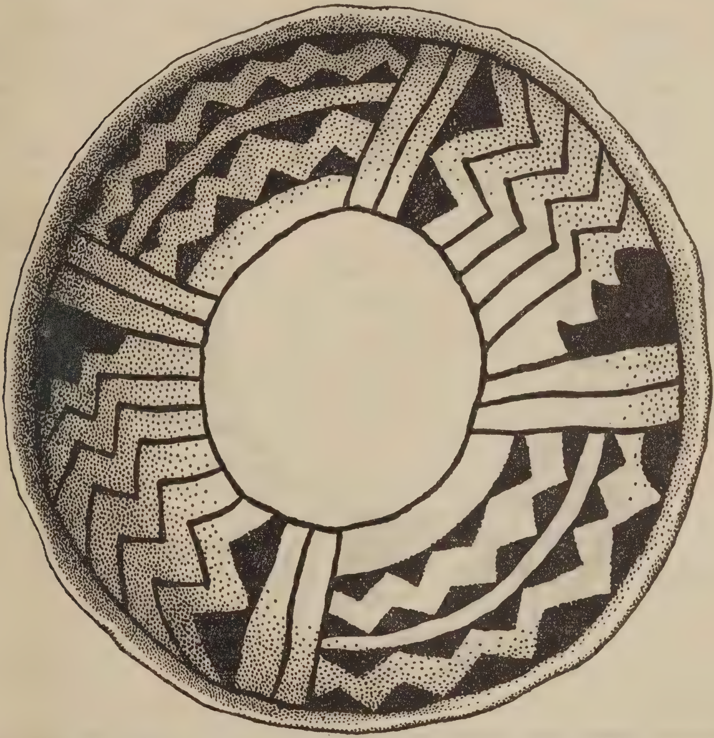


FIGURE 42.—Band pattern on Kana-a black-on-white bowl.

three of the dotted lines in one unit and two in the other. The other two units consist of two main figures. One is composed of opposed double-tipped triangles. The other has double-tipped triangles opposed to double-tipped terraced elements. The arrangement of these is such that a hollow triangle is formed with the opposing elements on the inside. The units in the band are separated by vertical, parallel lines. There are three lines in three of the sets, while the remaining one has four. The rim on this vessel was not painted. A simpler form of the Kana-a band consists of a row of opposed triangles separated by two parallel-zigzag lines (pl. 26, *e*). Each of the triangles in this pattern has a hollow rectangle near the base and in this rectangle are two, short parallel lines. The characteristic blurring of the lines is evident on all of these specimens.

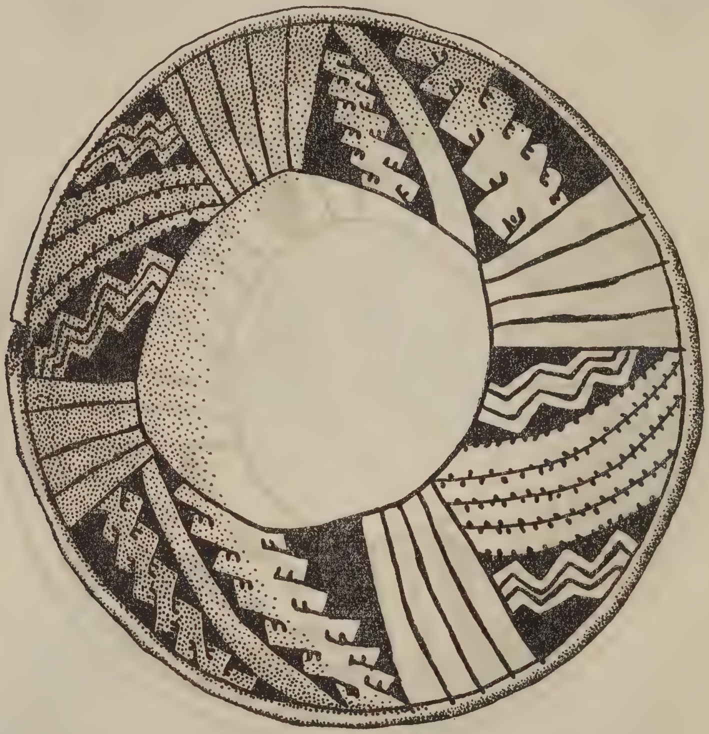


FIGURE 43.—Kana-a style of bowl decoration from early Developmental Pueblo period.

Opposed-dotted triangles were used in other forms of the band design. The bowl *b*, plate 26, has this element in the lower portion of a double-row pattern. The opposed triangles are connected by interlocking, continuous volutes. The upper part of the design is composed of squiggled hachure. Both the pattern and the bowl are characteristically of the Little Colorado series. A different use of the opposed-dotted triangle element is that in the band on *d*, plate 26. In this design the main motif is a pendant unit of single, opposed triangles. There are nine of these and they are bordered by a pair of parallel-stepped framing lines. On many vessels these framing lines would complete the lower edge of the pattern, but in this case there is a definite lower bordering line of the simple encircling type. The rim on this bowl is painted. The vessel is one of the Little Colorado variants of the Kana-a type of pottery. The bowl next to it(pl. 26, *c*) also belongs to that group. The decoration on this specimen is rather crude, the brush work suggesting the hand of a beginner. There are four units in the band. Triangles with volutes opposed to dotted triangles with volutes that interlock with those on the plain examples, and tipped triangles are the main elements. They are placed in a rather hit or miss fashion in the units. The latter are separated by single, vertical lines. The rim of this bowl also has the lip paint, making a bordering line for the entire pattern.

Elongated triangles, pennants, and leaflike elements supply the motif in many of the bands. One of the simplest decorations in this style is that on one of the Chaco bowls of the Escavada series (pl. 27, *c*). Here pairs of opposed-scalloped pennants interlock to form the units. The latter are placed at intervals around the sides of the bowl without any framing or separating lines. In one sense this pattern can be considered a variation of the style in which separate figures are placed around the sides of a bowl some distance below the rim. There is an encircling border for the design supplied by the painted lip on the rim. A more elaborate decoration containing opposed-scalloped pennants also has figures of the straight-line hachure (fig. 44). The opposed-pennants occur in single groups except for one place in the band where there are two. There is nothing to indicate a reason for this irregularity. In order to fit two figures into the available space it was necessary for the potter to make them about half the size of the others. A single figure of the same dimensions as the others would have filled the space nicely. One possible explanation for the occurrence is in the matter of the number of the opposed units. There are nine and if one of average size had been placed where the two small ones are there would have been but eight. Because so many of the designs have nine such figures it may be there was some significance attached to that number and the potter was desirous of conforming to beliefs connected with it. There is no paint on the lip of the rim on this bowl.

Pennant and leaflike forms in other combinations are shown on *a* and *b*, plate 27; *a* and *c*, plate 28; and *h*, plate 29. This group of vessels dates from the end of the Developmental Pueblo and the early Great period. They belong in the same general series as the pitchers *c* and *d*, plate 13. All of the wares are represented. There are Chaco bowls, Little Colorado, and forms derived from the Kana-a that probably belong in the so-called Kayenta series. The combination of three pennants into a variation of the so-called wing symbol with volute (pl. 27, *b*) is a motif that is considered characteristic of the Puerco black on white [80] and it probably occurs in that series with as much frequency as in any other. It is certainly a Little Colorado style, in a general sense of the term rather than the restricted form used in this paper, rather than Chaco or other eastern pattern. On the other hand *a*, plate 28, is a pattern often called Puerco that would be equally at home in the Chaco Canyon. The same may be said for *a*, plate 27. The decoration on *h*, plate 29, was not well drawn, but the design clearly belongs in this group. An interesting feature of this bowl, however, is the dotted rim. This is definitely a north-

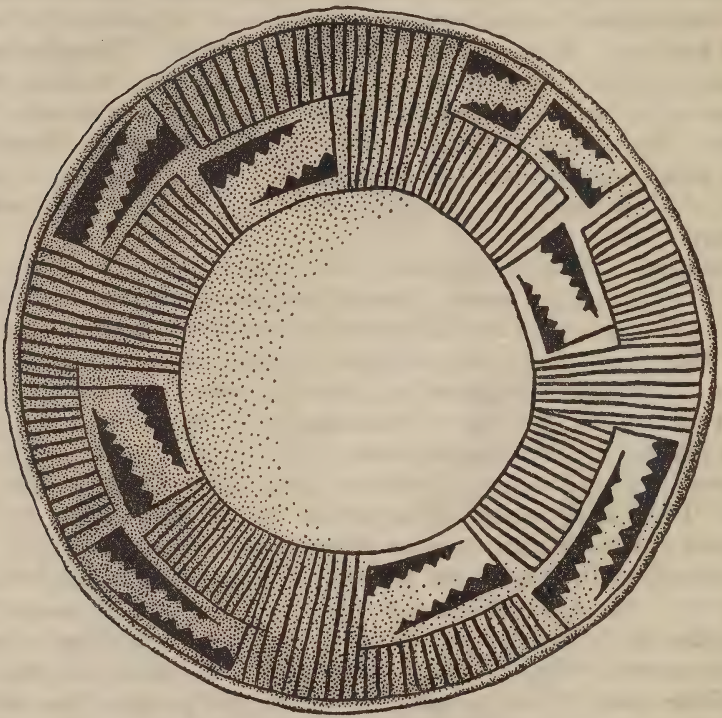


FIGURE 44.—Band design on bowl of Little Colorado series.

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[80] Gladwin, 1931, pl. 25, A.

eastern feature and is one of the few examples found in the Whitewater District.

Bands with a checkerboard motif are common. The simplest form is one in which the entire band is composed of rectangular squares (pl. 28, *e*). The potter became confused in several places and did not maintain the correct alternation of painted and open squares, yet the design as a whole gives the impression of a regular checkerboard. The rim of the bowl was painted black but most of the pigment has rubbed off. The vessel belongs to the Little Colorado series of the Developmental Pueblo. The use of the checker motif in a combination band pattern is illustrated by *b*, plate 23. This design has four units of the checkerboard elements. They are separated by rows of simple triangles. The latter were not well painted and the individual elements range from approximately equilateral examples to those more suggestive of the leaf form. The rim on this vessel was not painted. The bowl is a poor example of the Chaco series.

There is another style of band decoration that is somewhat involved and decidedly more sophisticated in conception than many of those already described. Two examples are shown in plate 29, *f* and *i*. The combination of rectilinear and curvilinear elements with interlocking volutes and interlocking major units is typical for this style. The bowls suggest that they may have been made by the same potter and the fact that they were together as mortuary offerings in the same grave lends support to such a belief. The style is not well represented in the Whitewater collection and its affinities are not clear. A canteen with the same general type of pattern was found at the Long H Ranch [81] and there were a few fragments from bowls indicating that it had been used in their decoration. Traces of it, although no complete examples, were present at the Village of the Great Kivas on the Zuñi Reservation, and potsherds showing portions of similar motifs occur on sites along the Puerco River both east and west from the Whitewater. The design also occurs on red bowls, and perhaps was more widely used on them than on the white. It may well be a characteristic Little Colorado style of decoration for the beginning stage of the Great Pueblo period.

Hachured designs were popular on bowls as well as on other vessels. Examples of the squiggled hachure, the early form of this element, have already been mentioned. The later straight-line type was occasionally used in band patterns, but generally appears in allover decorations. One of the band styles is shown by *g*, plate 29. In this example there are four interlocking fret units with upper and lower bordering lines. The framing lines of the unit figures are rather heavy, while the oblique composing lines are comparatively light. The units in this band are quite like those on the body of the pitcher *e*, plate 14. They are a typical Chaco figure. The rim of the bowl is painted with a solid line. Meander motifs were quite popular and *e*, plate 29, is a good illustration of that style. The so-called whirling figures were one of the main patterns in hachured designs. Two examples are *c* and *d*, plate 29. The first has four triangular scrolls projecting from a central rectangular figure. The shaded tips, as previously pointed out in discussion of hachured patterns on the pitchers, are typical of one stage in the development of hachured designs in the Chaco Canyon. The lip of the rim is painted black, but has a break in the line at one point. This was not accidental or due to abrasion of the rim. It was an intentional break. Modern Pueblo Indians explain the feature with the statement that an opening is left in the line in order that the spirit of the vessel can pass in or out at will. If this was not done the vessel would crack. It would be interesting to know how this idea developed and what group was responsible for it. The feature did not appear until about the middle of the Developmental Pueblo period. During the Great period it was common on bowls, even on jar and pitcher rims, in the Chaco cultural range and on certain of the Little Colorado wares. In the Whitewater series more of the Chaco type bowls have it than those from all other groups combined. The design in the second bowl (pl. 29, *d*) has the same rectangular figure with projecting arms, but instead of a scroll motif at the ends of the arms there are three pennant-shaped units. The hachure throughout most of the pattern is of the "oblique" Chaco style. One of the projecting arms, however, has the longitudinal Little Colorado form. This bowl also has a painted rim with the line break.

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[81] Roberts, 1931, b, pl. 14, c.

Balanced patterns of solid and hachured figures occur in a number of forms, but a majority have some variation of the whirling figure in the hachured portion of the decoration. This is well illustrated by bowls *a* and *b*, plate 29. On *a* the projecting arms of the central rectangular figure combine a stepped segment with a curvilinear scroll or volute. The hachure is in the Chaco style. The opposing solid figure is curvilinear, rectilinear and stepped wherever the hachure takes that form and the volutes at the end interlock with the hachured ones. The rim of this bowl was painted, but portions of the lip have been worn away and it is not possible to tell whether the line break was present or not. The second design (pl. 29, *b*) is somewhat simpler in that both the hachured and the solid figures are rectilinear throughout. The hachure in this pattern is also of the Chaco style. The painted rim has the line break. Structural traits of the bowls indicate a Chaco derivation, yet they correspond to one of the groups in the Puerco black on white [82] and are very suggestive of some of the Tularosa forms. The latter may not be true components of the Tularosa complex, however, but examples of a Chaco style influence in that region.

Other forms of the contrasting solid and hachured figures are illustrated by *k* and *l*, plate 29. The first is a band design with two similar rows. The solid figure in each is a stepped meander and the hachured elements are opposed-terraced units with the stepped sides paralleling the steps in the meander and the straight sides paralleling similar portions of the solid motif. The hachure is again in the Chaco style. The rim was painted and there is a line break. The second design (*l*) is more complicated and is one that belongs to the allover category. The hachured figure consists of a band around the wall just below the rim. The band expands to form balanced pendant figures. Two of these suggest superimposed triangles and two are fishtailed panels whose tips touch a portion of the solid figure at the center of the bowl and form a negative diamond that makes the space for a solid diamond in the center of the pattern. The tips of the triangular figures and the ends of the fishtails are painted solid. The contrasting solid figure is H-shaped with the ends of the vertical lines expanded to form double pennants that are opposed to the ends of the triangular portions of the hachure. The hachure and shaded tips are Chaco styles and the painted lip of the rim has a line break much in evidence. Another form of allover decoration in the hachure is one based on the checkerboard motif. In such patterns alternate squares are filled with oblique-hachure lines instead of being painted solid (pl. 28, *b*). This style had considerable vogue in the Chaco Canyon during the latter half of the Developmental Pueblo period. One variation of it produces a woven pattern, the effect being obtained by hachuring all squares but having the composing lines in adjacent squares run in opposite directions. No examples of this form appear in the Whitewater series, although it was contemporary with the motif here illustrated. The present specimen has a painted lip on the rim and also the line break.

There are other forms of allover decorations in addition to those previously described. A good illustration of the style during the earlier stage of the Developmental ceramics is *f*, plate 25. The main motif is triangular-scroll figures with portions of the scroll embellished with tipped triangles and terraced, tipped triangles, with open spaces and dots that suggest eyes. The latter elements are common on vessels of the Transitional or Red Mesa black on white in the pottery of the Chaco Canyon. They were not used as extensively in the Whitewater region, but do appear from time to time on potsherds from jars and pitchers as well as from bowls. The dot in a negative circle also appears on some of the Little Colorado wares, particularly the Puerco black on white, but generally was used singly rather than in pairs. The rim on this bowl was painted. Whether or not it had a line break can not be determined because a portion of the rim is missing. The line is continuous on the remaining intact section. The bowl represents a stage when the line break was not common, however, and it is possible that it did not have it. A later style of the allover decoration is one composed of heavy, solid elements. Curvilinear and rectilinear figures are generally combined to form a pleasing pattern in which the painted and unpainted areas are approximately equal. The result is a positive or a negative design in the same motif, depending whether attention is focused on the light or the dark parts of the pattern. A good illustration of the type is *j*, plate 29. The central figure in the design is a scroll framed by two other scrolls that join to form a single tip that interlocks with the curved ends of the central element. Bordering the main figure, on opposite sides of the bowl, are two pendant units composed of opposed triangles. The lip of the rim is painted and there is a line break where one of the open spaces or negative portions of the design touches the rim. Similar patterns are found on red bowls. As a matter of fact, the style was considered typical of the black on red until examples of it began to appear in groups of the black on white and in horizons that antedate the type of redware on which it occurs. This motif is occasionally observed in contrasting solid and hachure patterns. In most cases the central scroll is all that is hachured, the remainder being solid black. The style seems to be a Little Colorado development and there probably is some affinity between it and decorations such as those on the two bowls *f* and *i*, plate 29.

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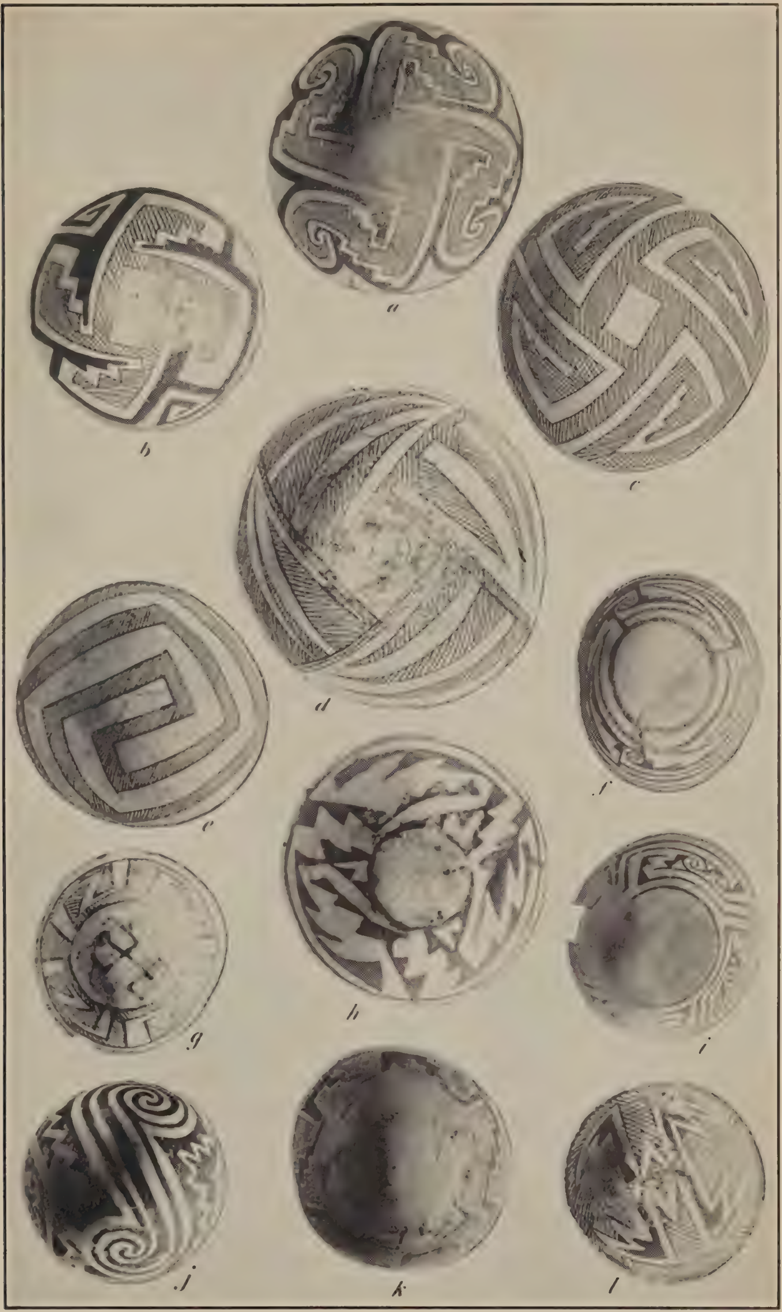
[82] Gladwin, 1931, pl. 33, *c* and *d* (the composing lines of the hachure on these vessels are of the oblique style yet they differ in that the arrangement is such that they tend to form a woven motif in places) ; pl. 29, *b*, the right hand bowl.

Figures were placed in the bottoms of bowls during all phases in the Whitewater District. The practice was not common, however, and was not restricted to any particular series. The geometric life-form in the bottom of *g*, plate 29, is a good illustration of that type of figure. An outlined cross (pl. 26, *e*) was a favorite symbol and occurs in some of the ladle bowls as well as in the regular bowls. The hourglass with squiggled-hachure lines (pl. 27, *f*) appears in several variations. Sometimes it was painted solid rather than hachured.

None of the decorated pieces from red bowls are of sufficient size to warrant descriptions of the patterns on them. They appear to conform rather closely to the general styles mentioned in the reports


a
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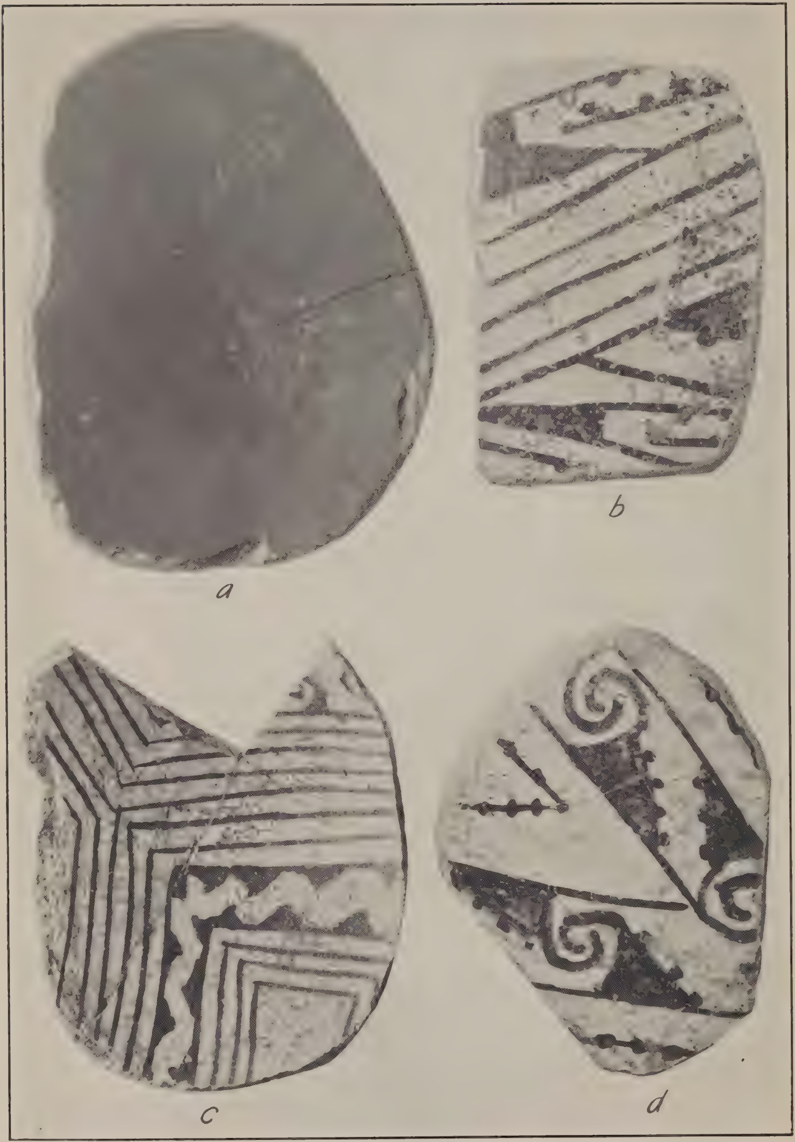
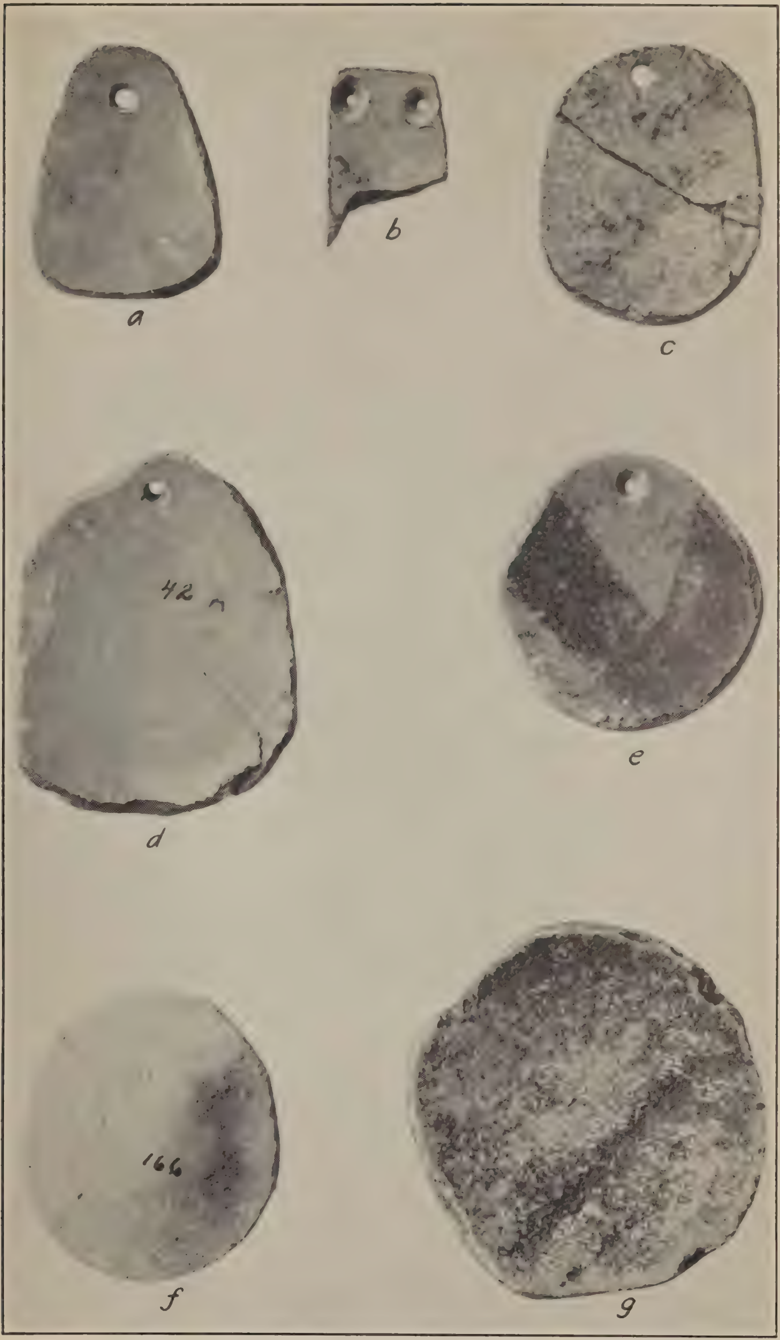
Bowls From End of Developmental and Beginning of Great Pueblo Period.



Potsherd Tools.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c
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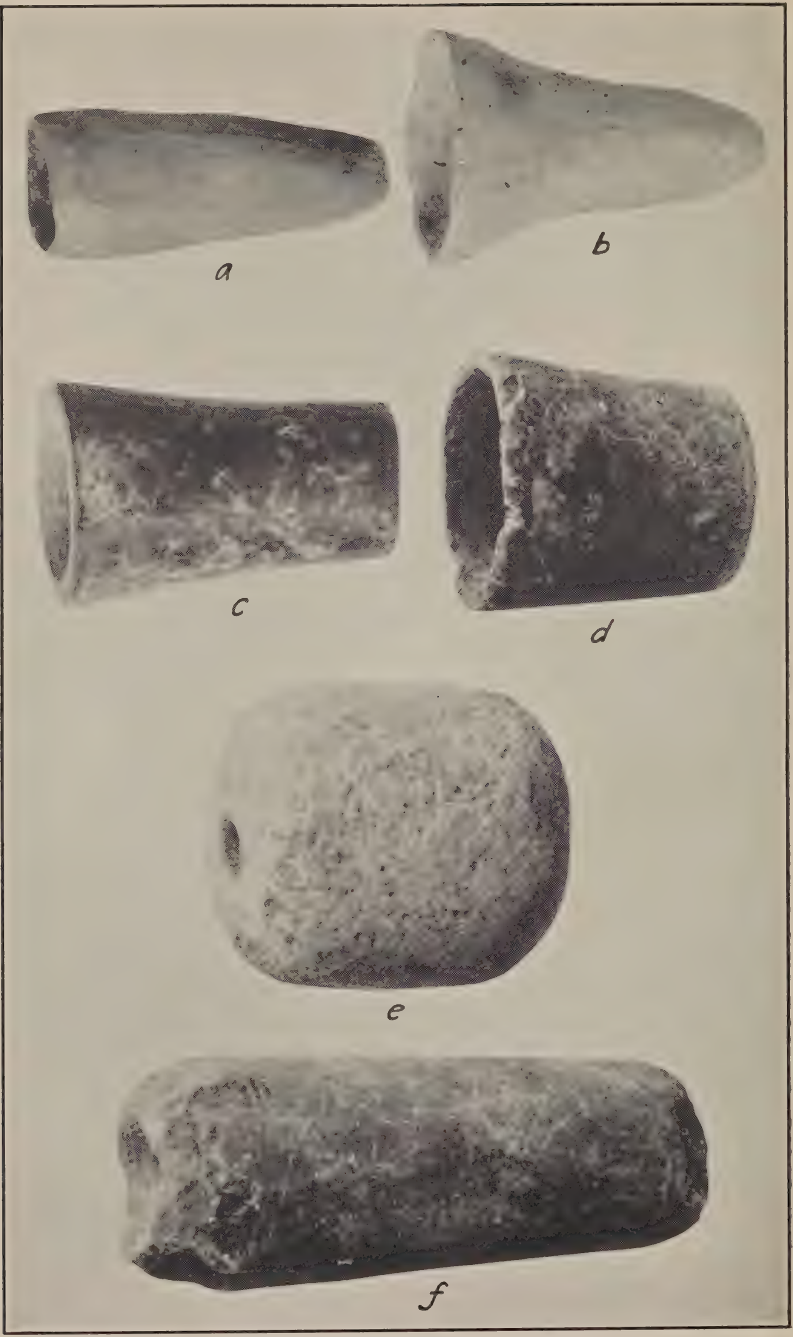
Potsherd Pendants and Disks.



Clay and Stone Pipes and Stone Cylinders.

previously cited in the discussion of the Whitewater types and those interested in such forms may refer to those publications.

Additional Objects of Fired Clay

There are a number of specimens in the collection which, although they are of fired clay, do not belong in the group of containers. Some of them are closely related to the pottery vessels, however, because they were made from fragments from broken bowls and jars. They consist of tools used in smoothing the surfaces of the clay vessels during the manufacturing process; scoops for other domestic purposes; round flat disks, some perforated at the center, others without the perforation; and pendants made from potsherds. A second group of objects in this general class is composed of the fired-clay pipes.

Potters' tools are of various shapes. Most of them, however, fall into two general forms one roughly oval and the other rectangular (pl. 30). On some examples all of the edges have been rubbed down and smoothed, on others only a portion was so treated. Of the specimens illustrated, *a* is from a black-interior gray-exterior bowl, *b*, *c*, and *d* are from Chaco I vessels, *b* and *d* being jar fragments and *c* from a bowl. An interesting feature about these tools is that all of those in the collection are made from Developmental Pueblo potsherds of the early part of the period and all with portions of designs on them are of the Chaco type. Whether or not this feature has a bearing on cultural traits is still to be determined. It may be only a coincidence that there are no Kana-a black-on-white sherds in the series, yet there is a possibility that some reason lies behind their absence. The Kana-a form perhaps played too small a part in the Whitewater District and because of its later arrival did not contribute as many potsherds to the various dump heaps, hence there was less chance that pieces picked up for use as tools would be of that ware. On the other hand collections from various sites in this general region, even where there was a much higher percentage of Kana-a types, only rarely contain potters' tools other than those made from Chaco and Puerco black-on-white pieces or from the black-interior forms. The same is true for material from sections within the area where the Kana-a type was the predominant form. This may be an indication that the trait was an eastern development. To conclude that such was the case, though, would be precipitate at present because there is too little information on the subject. Many reports on work fail to mention either the presence or absence of such tools and often when they do remark on their presence do not describe the pottery or give pictures on which to base judgment.

The true purpose of the disks is not known, although there are indications of their having been intended for certain uses. The disks with perforations are regarded as buttons for wearing apparel and as whorls for the ends of spindles. Examples have been found with fiber strings or leather thongs passed through the holes and held in place by knots. This led to the conclusion that they were buttons and they would have been serviceable in that capacity when attached to a garment. Others fastened to the ends of sticks are reported from various sites and these furnish the evidence for the belief that they were spindle whorls. Whether they actually served in the capacity of small flywheels to aid in the whirling of the spindle or merely as buttons at the ends of the shafts to prevent the thread from slipping off has never been determined. Those without perforations may have been unfinished objects that need only the boring of a hole to make them complete. On the other hand they may represent pieces for use in a game or counters. The Zuñi Indians have small, circular pieces of stone that they use in some of their games and inasmuch as they are about the same size and thickness it is possible that the potsherd examples may have had a similar function in spite of the fact that they are made from different material. The edges of the disks are well smoothed in most cases, although the irregular line of breakage may not have been ground away entirely (pl. 31, *f*, *g*).

Pendants were usually made from redware potsherds. Most of those in the present collection are red on one side and black on the other; they are from black-interior red-exterior bowls. A few were from painted vessels. One of these (pl. 31, *e*), was made from a piece of characteristic early Developmental black on red. The shapes vary. Some are pear-shaped, others are rectangular, oval or circular. A single perforation usually sufficed, but occasionally there are two as in *b*, plate 31. Example *d* was not completed. Specimens of this type are frequently found in association with beads worn as a necklace or as a bracelet. Those used on bracelets average smaller than those on the longer strings of beads that were worn around the neck.

Pipes of the tubular or cloud-blower type form another group of fired-clay objects (pl. 32, *a*, *b*; pl. 48, *f*). There are two main forms for these pipes. One is cylindrical, such as *a*, and the other more funnellike as illustrated by *b*. The latter seems to be the older shape. It is the common type for the Modified Basket Maker horizon and the early stage of the Developmental Pueblo. An occasional tubular specimen occurs in late Modified Basket Maker, but the shape is more characteristic of the subsequent Pueblo stages. The bowl portions of the pipes in the Modified Basket Maker period were not as deep as those for later horizons. In the former they average approximately one-fourth of the total length, while in the latter they constitute about one-half. There are no incised or punctate designs on the specimens in the Whitewater series. Decorations of this type are more of a Modified Basket Maker than a Pueblo trait, although an occasional example from a Pueblo horizon may be so treated. One of the tubular specimens in the present group has a small piece of turquoise set in the surface on one side (pl. 48, *f*). This is not a common method of ornamentation, however. Reed or bone stems were often set in the ends of pipes. None of them in this collection are so equipped, yet reeds rarely survive except in material from dry caves and may have been used here but no traces have remained. These pipes are too small for bone bits, although some of the stone forms (pl. 32, *c*, *d*), could have had them. It is is not likely that this type of pipe was smoked for pleasure. They probably were for ceremonial purposes, being used by the so-called medicine men or priests to puff clouds of smoke toward the cardinal directions during the progress of various rites. Modern Indians in the Pueblo area have similar pipes and employ them in that way, a function that led to the name cloud-blower.

The pipes were made from a paste like that of the regular containers, the true pottery. In most cases the paste quality is about midway between that for the culinary vessels and that for the painted wares. The perforation was generally obtained by molding the pipe around a twig or reed rather than by punching a hole after it was completed. The core was pulled out while the paste was still green. Evidence for this procedure is provided by broken specimens bearing the imprint of such a core and showing the striations produced by its removal. The core may occasionally have been left in the clay until the object was fired and thus was removed by the effects of the burning. A few of the broken pieces have small fragments of charred wood in some of the declivities in the perforation as an indication of such a practice, but the percentage is small in comparison to the other type.

The size range in the clay cloud-blowers is not large. The tubular forms are from 1⅞ to 2¼ inches (4.76 to 5.71 cm.) in length. The maximum diameters, at the bowl end, vary from ¾ to ⅞ of an inch (1.90 to 2.22 cm.), and the minimum, the bit end, from ¼ to ⅛ of an inch (6.35 to 3.17 mm.). The funnel-shaped forms have lengths from 2 to 2⅛ inches (5.08 to 5.39 cm.), bowl end diameters from 1¹⁄₁₆ to 1¼ inches (2.69 to 3.17 cm.), and bit ends from ³⁄₆₄ to ¼ of an inch (1.19 to 6.35 mm.).

There are no clay figurines, no nipple-shaped or funnellike objects, nor any clay models of carrying baskets in the collection. As previously mentioned, such articles commonly occur in association with Modified Basket Maker remains. The paucity of the latter in the excavated sites in the Whitewater District is probably the reason for the absence of that type of specimens from the collection. It is not likely that they were missing from the Modified Basket Maker complex in this region, although there is a possibility that they may have been present in reduced number because of the fact that the material belonging to the horizon represents its closing stage and such traits may have been passing from the complex at that time.

Bones and Bonework

The bones and bone implements collected from the Whitewater District show a number of interesting things both with respect to the animals and birds present there when the region was inhabited by the Anasazi peoples and from a consideration of the types of tools made from that material. Bones from the refuse mounds, and some of the implements as well, show that the animals were: mule deer (*Eucervus hemionus*), antelope (*Antilocapra americana*), jack rabbit (*Lepus californicus texianus*), lynx (*Lynx rufus*), fox (*Urocyon californicus*), kangaroo rat (*Dipodomys* sp.), ground squirrel (*Citellus spilosoma cryptospilatus*), and the dog.[83] There seem to be two sizes of dogs, one a rather small animal comparable to the terrier in his general measurements, and the other a medium-sized creature of about the bulk of a small collie. There are more of the latter than the former. These dogs seem to fall into the groups which Dr. Glover M. Allen has called the Plains-Indian dog and the short-nosed Indian dog, two forms that at one time were widely distributed in the warmer parts of the New World.[84] The bird bones represent the turkey (*Meleagris gallopavo*), the golden eagle (*Aquila chrysaëtos*), the little brown crane (*Grus canadensis canadensis*), and a large hawk of the genus *Buteo* that can not be identified as to species.[85] The turkey and eagle far outnumbered all other forms and of these two the turkey was more numerous. The turkey is the same as that found in most of the pre-Spanish sites. The same species of eagle and crane were found at the Long H Ranch southwest from the Whitewater. The presence of the crane bones is of interest inasmuch as they lend support to the feature, mentioned in Part I, of probable ponds and meadows in the Whitewater Valley at the time of the Anasazi occupation.

The worked bone consists of a number of different kinds of awls, punches, bodkins, needles, scraping tools, tubes, whistles or turkey calls, and gaming pieces. The objects fall into several categories on the basis of the nature of the material used and its treatment. One class comprises tools made with only slight modification of the original bone. Fortuitous splinters, probably resulting from the splitting of bones for the marrow they contained, were employed in the implements of another group. In some cases bones were cut and shaped intentionally for the specific object to be manufactured. Many of the implements were carefully smoothed and polished over all surfaces, others merely have a smooth and polished tip or edge. In the latter the polish is no doubt due to use, but in the case of the former it was an intentional finish as many parts of the surface would not attain so high a gloss unless purposely rubbed. Use unquestionably added to the polish, yet was not wholly responsible for it.

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[83] The identification of these bones was made with the kind assistance of Gerrit S. Miller, Jr., curator of the division of mammals, and H. H. Shamel, senior scientific aid, division of mammals, U. S. National Museum.

[84] Allen, 1920; Guernsey and Kidder, 1921, pp. 44–45.

[85] Dr. A. Wetmore, U. S. National Museum, identified the bird bones for the writer.

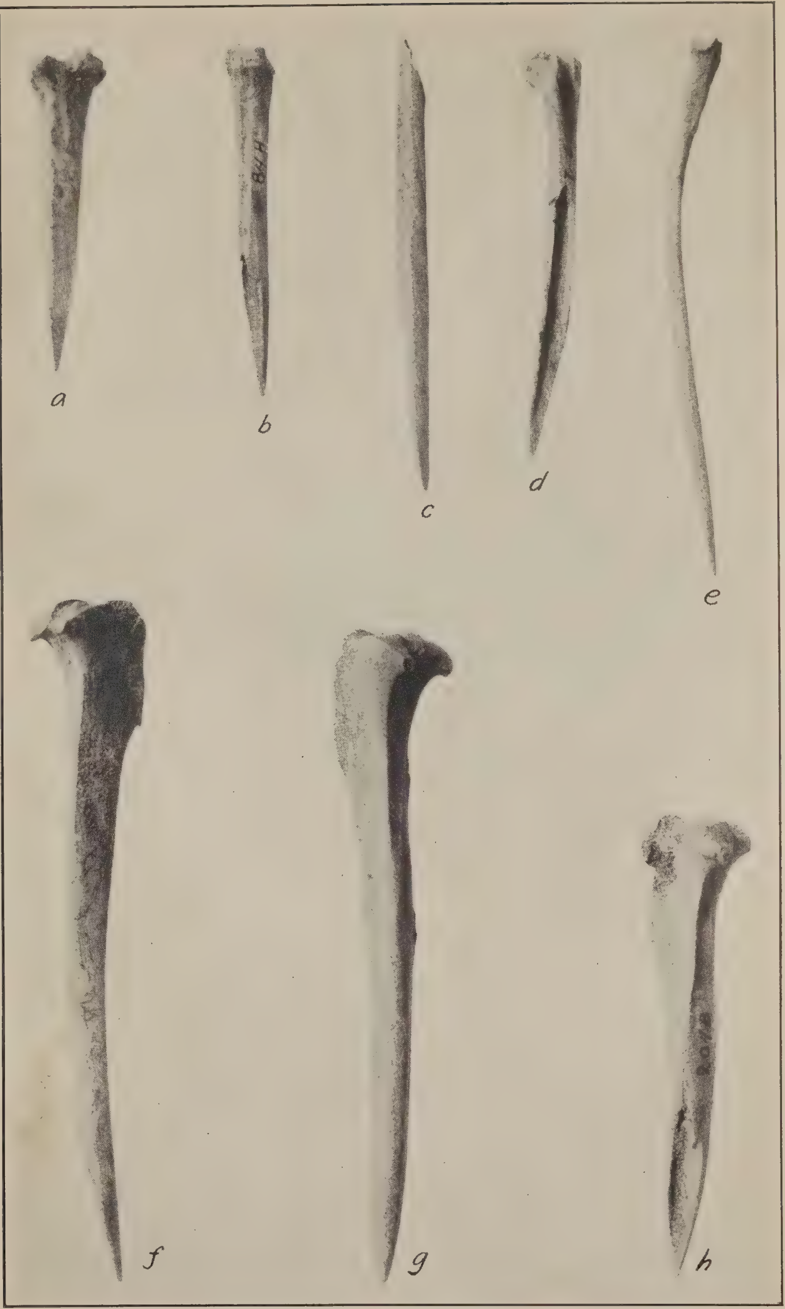
Examples of awls and punches (the distinction is largely that of the type of point, whether sharp or blunt) made with little modification of the original bone are illustrated in plate 33. These implements were made by cutting off one end of the bone and rubbing the shaft to a point. The cut is sharp on some, as *a*, *e*, *f*, and *g*, and on others rough and jagged, more of a split and break than an actual severing of the bone (*b*, *d*, and *h*). The bones in this group, with the exception of *c*, are from the jack rabbit. This animal supplied the material for many bone tools, as well as being an excellent source of food, and a great majority of such specimens show no greater alteration of the bone than those illustrated. The implement *c* was made from the fibula of a small mammal, but because of the absence of the ends, an important feature in identification, the particular animal represented cannot be recognized.

Awls and punches made from specially prepared, yet only slightly altered bones are illustrated in plate 34. The upper series (*a* to *d*) are common in Anasazi sites. They were made from the cannon bone of the deer and were fashioned by splitting the bone lengthwise along the natural groove down the center of the anterior surface which, with the division in the articular surfaces at the ends, provides an inherent line of cleavage. The matter of length is largely relative as repeated sharpenings would result in a shorter implement, yet the short or stubby form (*d*) is characteristic of the early stages in the Anasazi pattern, particularly Modified Basket Maker and early Developmental Pueblo. Its predominance in those horizons indicates that it must have been made in that form purposely rather than being the product of repeated grindings of the point. During late Developmental and Great Pueblo times the long types, of which *a* is one of the shorter examples, prevailed. The lower group (*e* to *h*) on plate 34 represents the type of awl made from the fibula of the deer. This bone was also split lengthwise, the articular surface being left at one end and the other sharpened to form the point. The polish on all these specimens is that resulting from use.

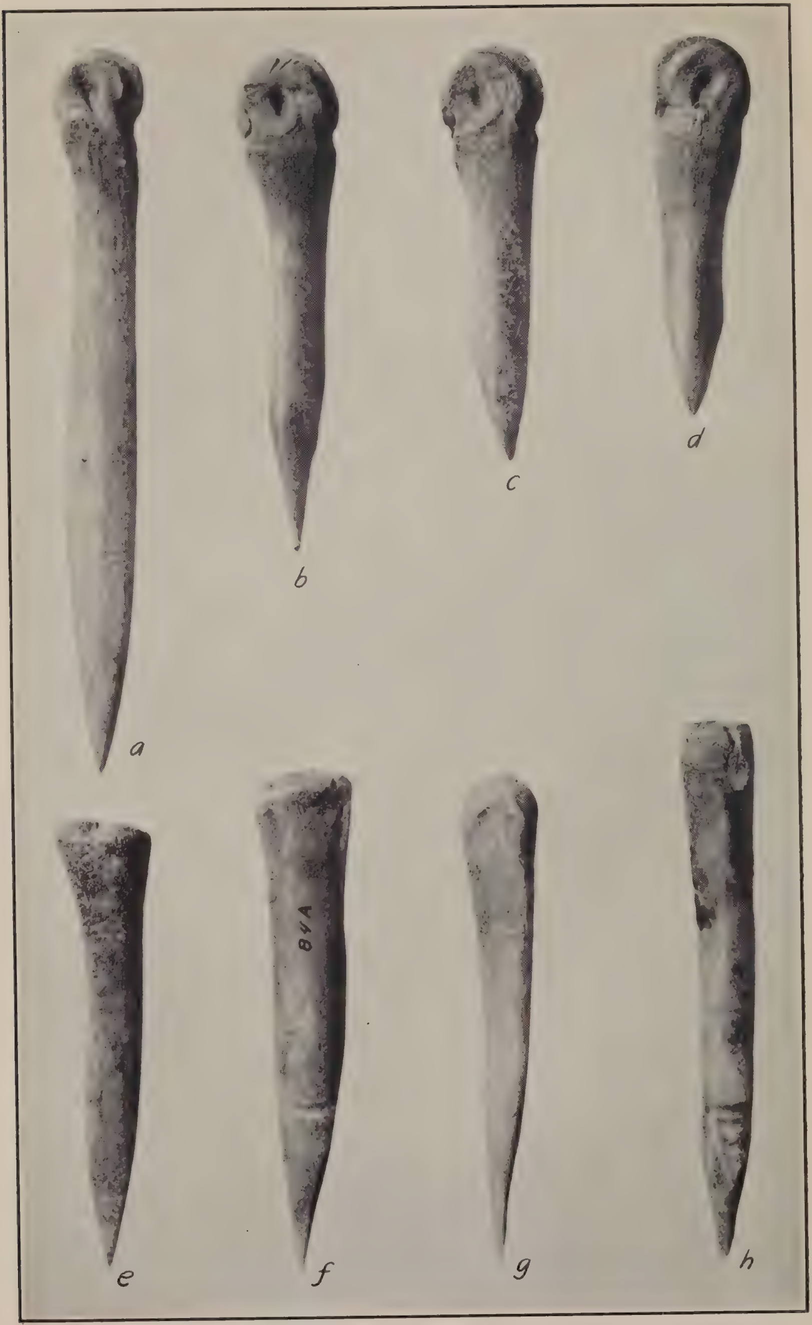
Characteristic awls of the fortuitous splinter type are illustrated in plate 35, and plate 36, *a*, *d*, *e*. Most of these specimens are from the shafts of long bones, probably from the deer as they are too large for any of the other animals represented by bones from the sites. The one marked *d* is part of a scapula, the shoulder blade. It was hacked out from the central portion of the bone and consists mainly of the spine, although portions of the supraspinous fossa and infraspinous fossa are present on either side near the upper end. Several of these awls (pl. 35, *a*, *b*, *f*, *h*) have a good polish while others only show the feature near their points (pl. 35, *e*, *g;* pl. 36, *d*, *e*).

Two forms of bodkins are illustrated by *b* and *f*, plate 36. The first was cut from the shaft of a long bone and has well trimmed and smoothed edges. Because of the flare and width of the upper portion, specimens of this type are often considered merely perforated awls rather than bodkins. The second example (*f*) is of the true bodkin form. It was made from the shaft of a long bone, probably the fibula of an antelope as the size corresponds closely but the removal of all identifying features in shaping and polishing the tool prevents certainty in this matter. An implement of this type would be very serviceable in some kinds of weaving and in threading cords through various textiles. Bodkins were frequently made from rib bones that were rubbed and scraped until quite thin. No whole specimens of this type were recovered but there are a few fragments from such implements in the collection. The perforations in the various forms of bodkins are generally much larger than those in the needles. The latter (pl. 37, *a*, *b*, *c*) are quite small in most cases. The needles as a rule were made from the splint bones from the front legs of the deer or antelope. When rubbed down and polished they are a good shape and size for the purpose.

The tubes of various sizes were cut from the shafts of long bones (pl. 37, *e*, *f*). Bones from the turkey and smaller birds, from rabbits and other small mammals furnished the material. It is not always possible to tell the source of the bone because of the removal of distinguishing features. The tubes were used as beads in necklaces and in bracelets of the wrist-guard type, as bits for pipes, possibly as drinking tubes, and as handles for awls and other types of implements. Those with apertures in the side are usually classed as flageolets if there are several holes, and as whistles or bird calls if there is but one. The single-holed variety with the opening at approximately the center on one side is the only kind found during



AWLS MADE WITH LITTLE MODIFICATION OF ORIGINAL BONE.


a
b
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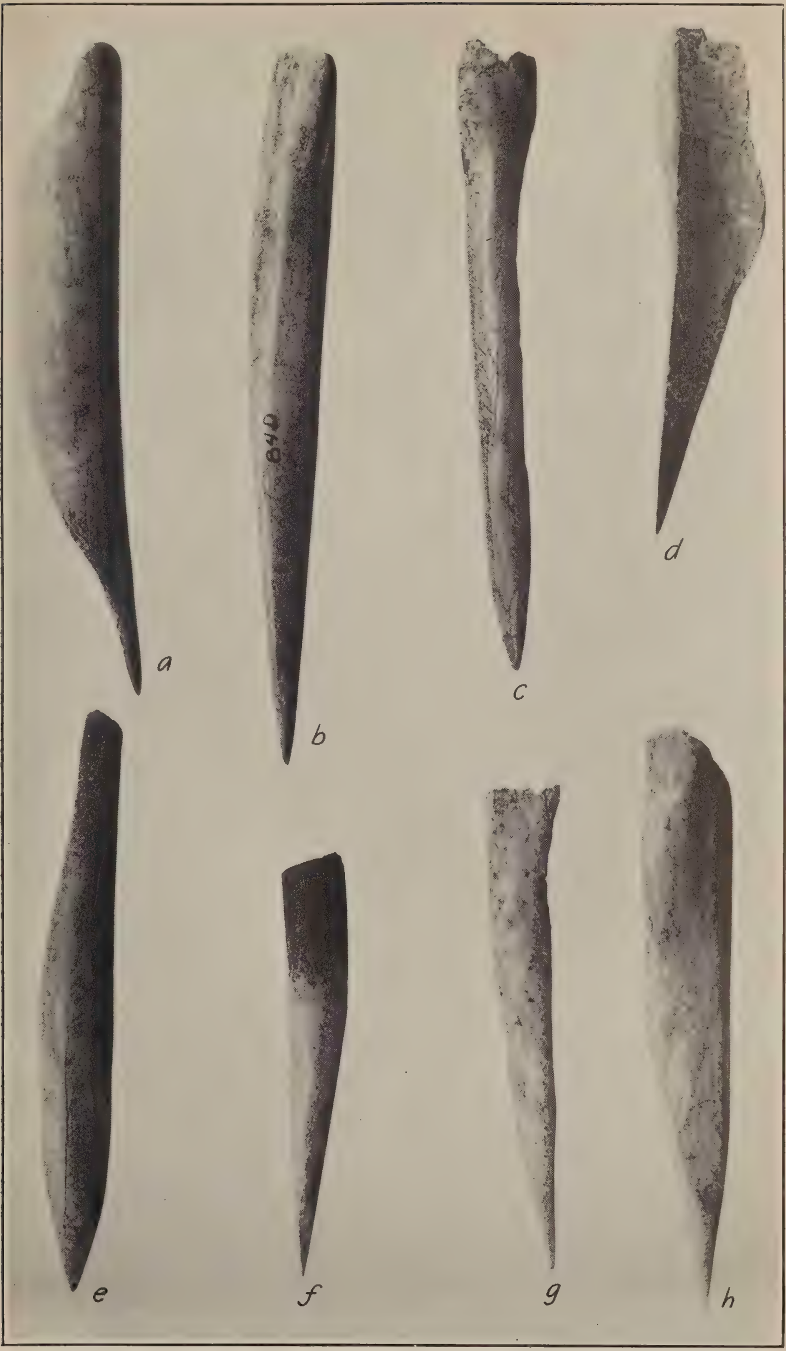
AWLS MADE FROM BONES PARTLY PREPARED FOR THE PURPOSE.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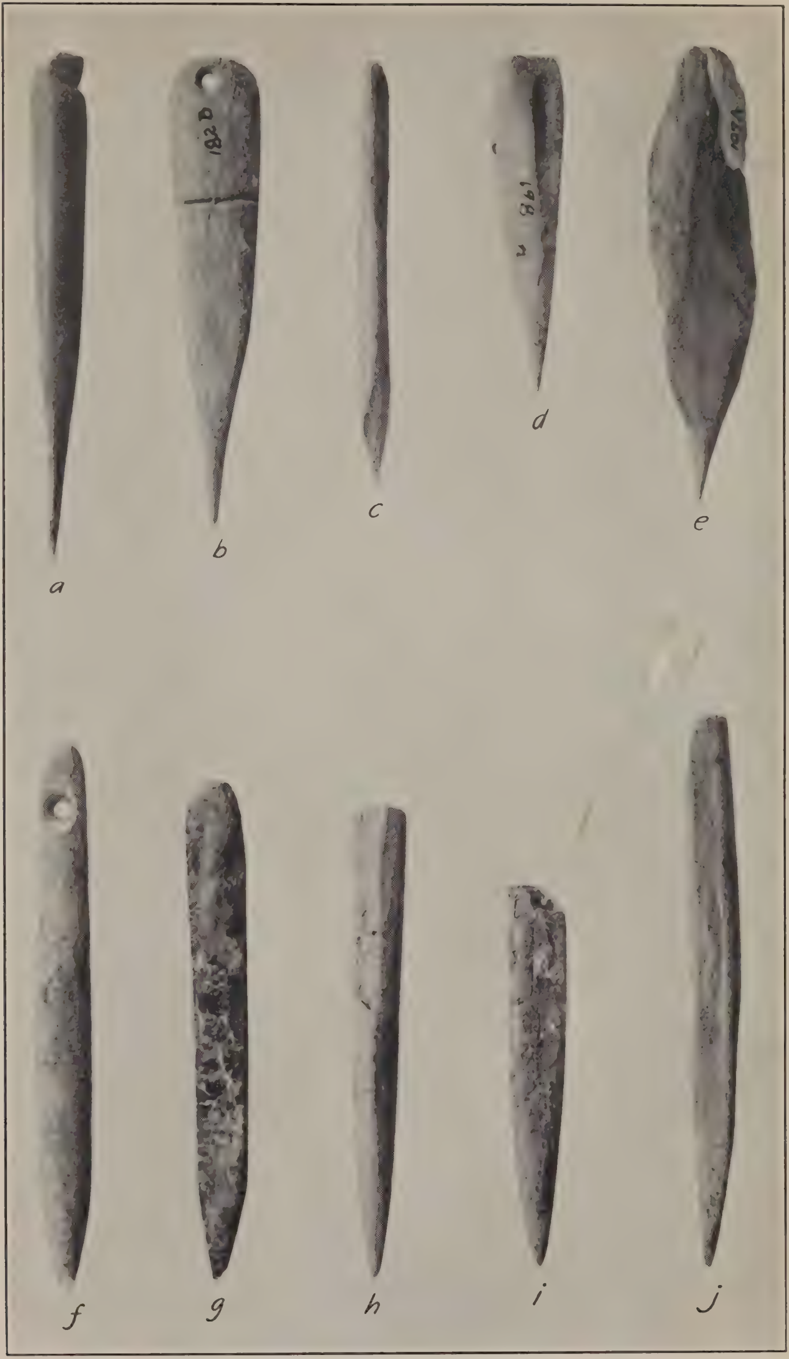
Awls of the Fortuitous Splinter Group.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AWLS AND BODKINS.

the Whitewater investigations (pl. 37, *d*). All of them are well polished and the edges of the apertures are carefully smoothed. The Zuñis assisting with the digging insisted that they were for calling turkeys and inasmuch as all of them were able to reproduce without difficulty, on any of these specimens, the various sounds made by that fowl it seems logical to suppose that was their purpose.

Gaming dies, small tabular pieces of bone with marks on one side and a high polish on the other, were plentiful and the three examples (pl. 37, *g*, *h*, *i*) are typical of the forms. A few of them have red ochre rubbed into the lines, while others are characterized by some black substance. The latter was thought to be the result of contact with charcoal or ashes in the refuse until a number were found under conditions that made clear the fact that the incisions were intentionally emphasized with the dark material. There is nothing to indicate how these objects were used, but they probably functioned as the pieces in some variation of the bowl or basket game so widespread among the Indians. They could, of course, be counters and function in that capacity in connection with some other kind of game.

The bone-scraping tools probably served in the preparation of hides, aided in skinning animals, and in some cases may have been used in smoothing the surfaces of pottery. Most of these implements are characterized by one sharp, smooth edge. A few have several such edges. The tools were fashioned from various bones. Some are from the shafts of long bones (pl. 38, *a*, *b*, *c*), which permitted the shaping of long, thin blades. When made from the proper portion of the shaft there is a slight curve to the implement (pl. 38, *c*) that greatly increases its efficiency. Such a tool would function extremely well in removing the skin from a carcass. A short, stubby form of scraper or flesher was made from the phalanges of the deer (pl. 38, *d*, *e*). One end of the bone, including the condyle, was removed and a beveled edge supplied. This type of tool is common in the northern parts of the Anasazi province and is particularly numerous in sites belonging to the Chaco pattern. None of the characteristic San Juan scrapers made from the humerus of the deer with which this small form is so often associated were present in the Whitewater. This, however, may be owing to the fact that so little work was done in the Great Pueblo horizon, the cultural stage with which that particular implement appears to be correlated. Examples were found at the Long H Ranch and at the Village of the Great Kivas on the Zuñi Reservation, so the type was not unknown in this region. In both of the latter locations the specimens came from ruins of the Great Pueblo stage, hence it is possible that examples might be found in the large ruins in the Whitewater District. The purpose of the curiously shaped implement (pl. 38, *f*) made from the scapula of a deer is not clear. The top of the spine was cut away and then a large section was removed leaving the long, narrow strip of the inferior border and inferior angle. The inner or cut edge of this projecting strip is the one that shows use. It is smooth and has a good polish augmented by a permeation of grease, an indication that its function pertained to the preparation of skins. The anterior end served as a handle and exhibits a certain amount of smoothing acquired from the palm of the user. When first found the thought was that this object might have been intended to function in the capacity of the implement rubbed across a notched stick or bone, the rasping instrument employed by many Indian groups to accentuate the rhythm in their songs and dances. Both the Hopi and the Zuñi make use of them in various ceremonies and the rubbing implement is frequently a deer scapula, hence the idea that the people in the Whitewater District followed a similar practice. The edges on the bone, however, indicate otherwise as their quality is of a nature produced by soft materials. The minute scratches and abrasions caused by contact with harder, notched surfaces are absent.

There was little indication in this district of the use of bone in the making of ornaments, excepting, of course, the tubes made for beads. Pieces from two different finger rings fashioned from this material were recovered from the refuse mound associated with the Great Pueblo ruins, but there were no traces of pendants, pins with carved heads, or hair ornaments such as are often found in Anasazi sites. Not enough remains of the rings to tell whether or not they were plain or, like some of those from the Chaco Canyon, were decorated with carved figures or insets of turquoise. The fragments indicate that one of the rings had an approximate inner diameter of 11⁄16 of an inch (1.74 cm.), a width of 3⁄16 of an inch (4.76 mm.), and a maximum thickness of ⅛ of an inch (3.17 mm.). The inner surface was flat and the outer convex with the area of greatest thickness at about the center of the cross section. The other ring, by reconstructing a circle from the arc of the fragment, had a diameter of about 9⁄16 of an inch (1.42 cm.), a width of ⅝ of an inch (1.58 cm.), and a thickness of ¼ of an inch (6.35 mm.). The area of maximum thickness was larger on this example as the curves from the inner edges to the outer were short and abrupt instead of long and sweeping as on the other.

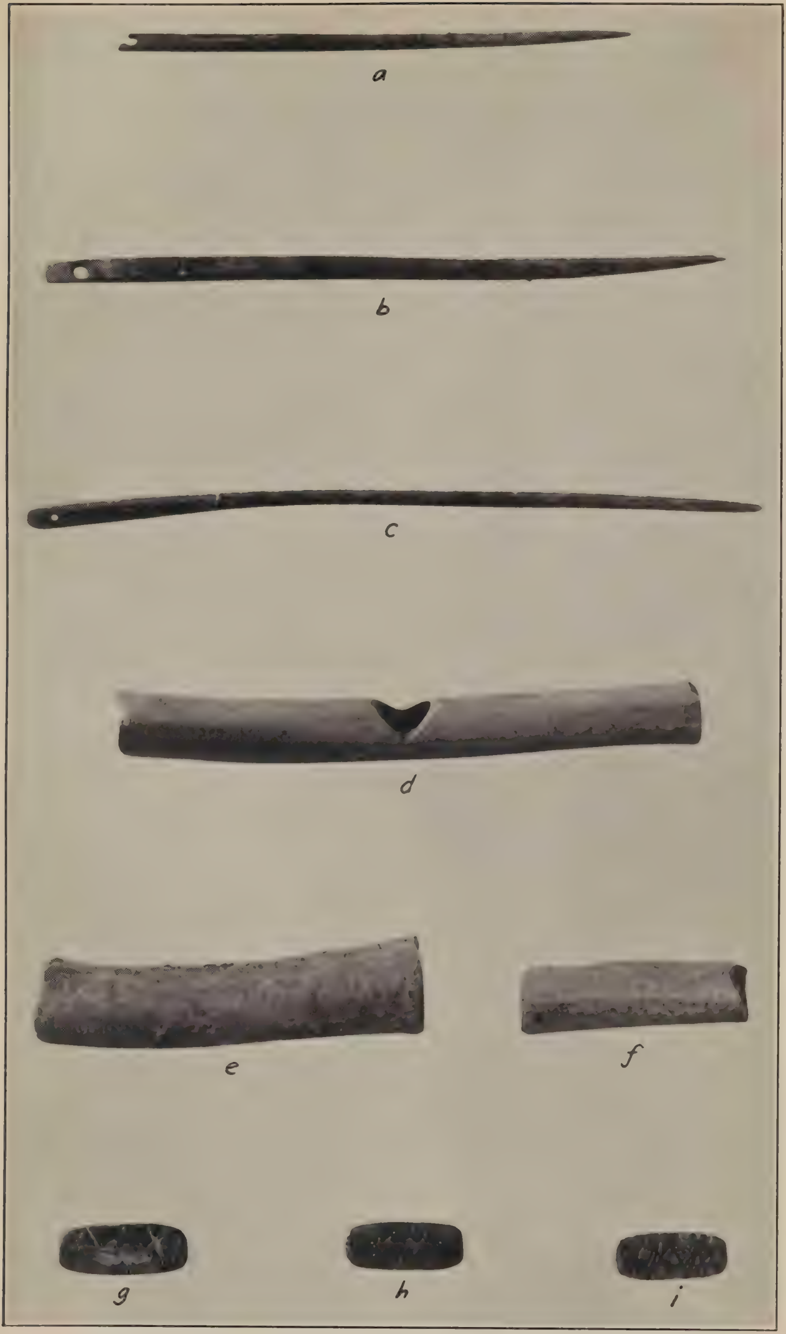
There is little in the way of period or horizon differences in the bonework. Except for the fact that the short, stubby cannon-bone awl was more numerous in the early part of the Developmental Pueblo stage than later and the long awls made from the same bone predominated at the end, the bone tools were the same throughout the occupation. From first to last the tubes, whistles and gaming dies exhibit the same forms. The rings presumably were restricted to the Great Pueblo horizon.

Objects of Stone

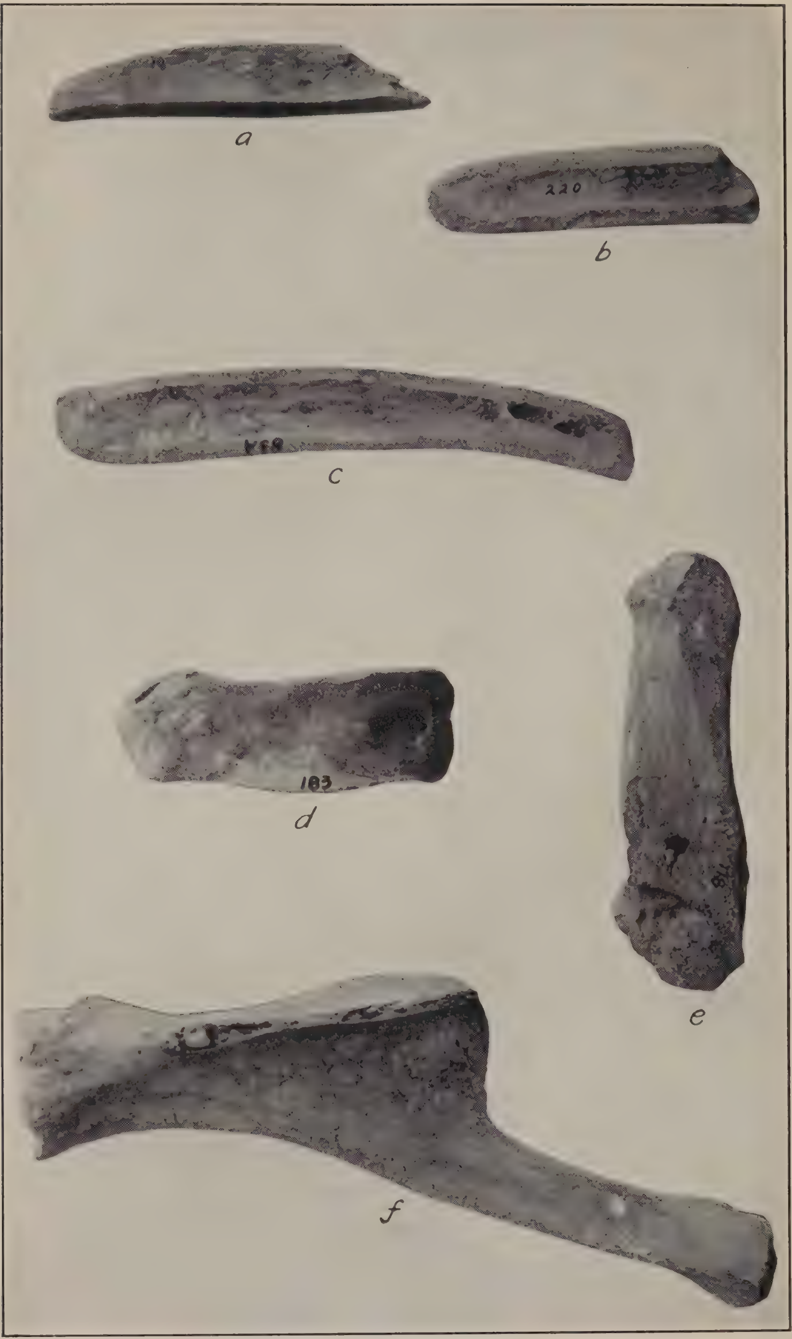
The collection of specimens from the Whitewater District contains numerous tools, implements, weapons, ornaments and other articles made from stone. Included in the list are milling stones, axes, mauls, paint mortars and a form of palette, pipes, arrowheads, knives and scrapers, pottery smoothing stones, and a group of small objects of unknown purpose. Various kinds of stones were used in the manufacture of the different articles. The series contains sandstone, diorite, amphibolite, petrified wood, lava, slate, chalcedony, jasper, obsidian, chert, quartzite, and alabaster. Turquoise was used for some of the ornaments.

The milling stones are of two types. One is an oval form (pl. 39, *a*), the other the open-end trough variety (pl. 39, *b*, *c*). All of the examples recovered were made from a hard sandstone. Little effort was expended in shaping the outside edges, but the grinding basins or troughs were pecked to the desired shape and all show the effects of grinding. The trough type far outnumbered the oval form. Both have a wide distribution and cannot be considered characteristic of any one group. The trough type represents the early style for the Anasazi, that used during Modified Basket Maker and the Developmental Pueblo periods. In the Great period there was a shift to a flat form that has persisted down to the present day in the Pueblo country. The basin-shaped type continued unchanged from Basket Maker to modern times. The main features about the basin type are that the grinding area tends to an oval outline with one end almost reaching the edge of the stone, while the other is some distance from it. This is probably owing to the manner in which it was used. The person doing the grinding presumably sat at the end where the basin is some distance from the edge of the stone and in pushing the hand stone back and forth repeatedly approached more closely to the far end than to the near one, hence had a tendency to wear the basin in that direction. In this type of milling stone the grinder held in the hand could be moved in several directions; perhaps on occasions it was used with a rotary movement. For this reason the hand stones, generally called manos, were circular or oval in shape like that accompanying *a*, plate 39. This mano was in the basin when the stone was found. The hand stones employed on this type show wear on one side only and that side is definitely convex as a result of its contact with the grinding surface of the basin. The size range in the basin metates shows lengths from 1 foot 7 inches to 1 foot 9½ inches (48.26 to 54.61 cm.), widths from 1 foot 1½ inches to 1 foot 4½ inches (34.29 to 41.91 cm.), and thicknesses from 4 inches to 6 inches (10.16 to 15.24 cm.). The hand stones of the circular variety have diameters from 4¼ to 4½ inches (10.79 to 11.43 cm.), and thicknesses from 1½ to 3½ inches (3.81 to 8.89 cm.). The oval forms are somewhat larger with short diameters from 4¼ to 5 inches (10.79 to 12.70 cm.), long diameters from 5¾ to 7½ inches (14.60 to 19.05 cm.). Thicknesses are the same as for the other group. It has been suggested that this type of metate was intended primarily for use with wild seeds and nuts rather than for corn. Whether or not this was the case is not known, but the fact that the form is absent from many sites in regions where there was a paucity of such products lends some weight to the supposition. There was no evidence to show how these stones were placed for use in the houses. The only examples recovered from the interior of structures were in corners near the wall where they could not have been employed with ease. They must have been moved out into the room when needed.

The main characteristics of the trough-shaped metates are parallel sides for the groove that restricted the hand stone to a forward and backward movement; the open end from which the meal could drop into a shallow basket or bowl; the shelflike projection at the operator's end on which to rest the mano (in later stages this feature was carefully shaped and worked into a shallow tray and became what is sometimes called the Utah-type); and the concavity of the trough with the deepest portion at about the center. The hand stones are usually roughly rectangular or slightly oval in form. Some show wear on one side only, others have it on both. The grinding surfaces are only slightly convex as a rule, sometimes are nearly flat. The ends generally exhibit the effects of rubbing against the sides of the trough. Some of the larger manos have finger holds pecked in the edges, one at the thumb side and three on the other, but this was not common. Several manos of varying degrees of coarseness seem to have been provided for each metate. This was indicated in a number of cases where a single milling stone was accompanied by a number of the hand stones that fall into three categories, coarse, medium and fine. They probably were intended for the production of different grades of meal or for use during different stages in the grinding process. The modern Pueblos usually have three metates in the mealing bins in their houses, sometimes there are several sets of threes, consisting of coarse, medium, and fine stones. The grinding is started on the coarse one, the meal from it is treated on the medium one, and then completed on the fine stone. It is possible that in the earlier stages somewhat the same effect was gained through the use



Needles, Whistle, Bone Tubes, and Gaming Pieces.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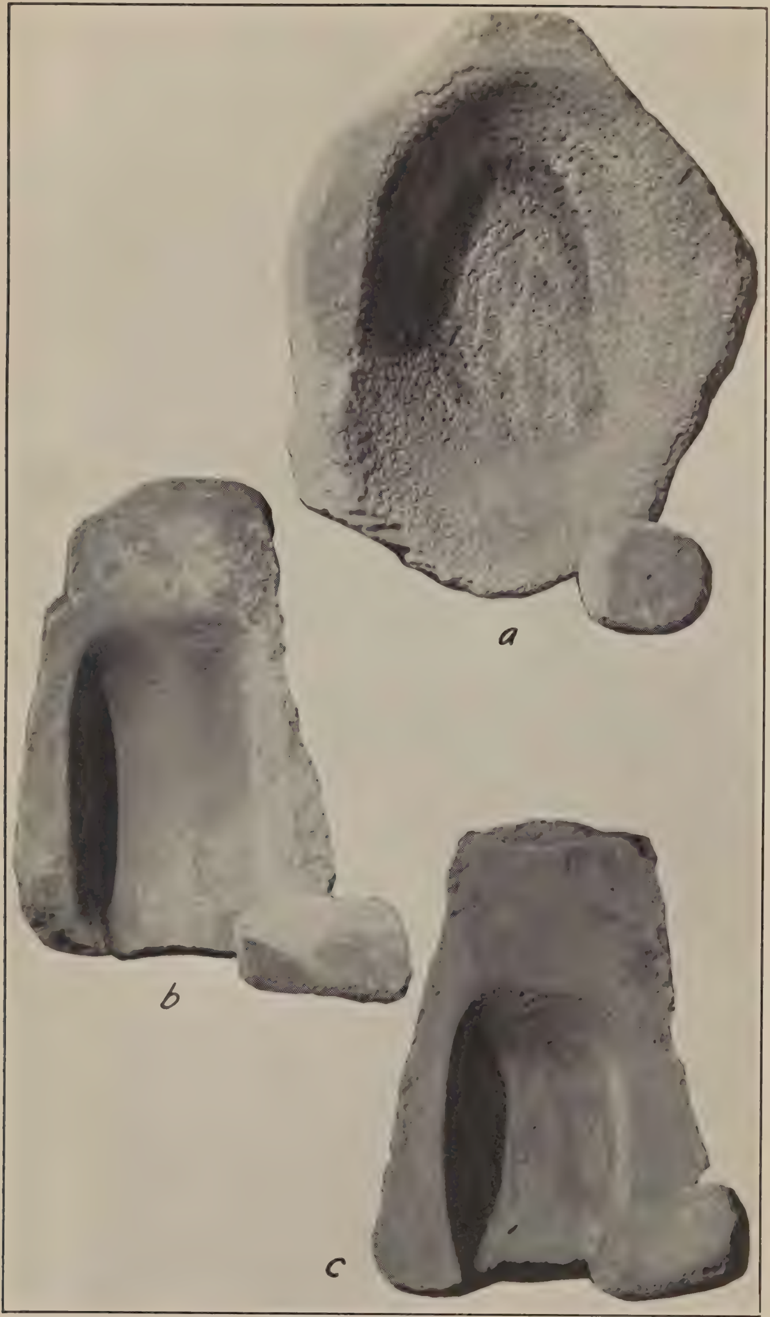
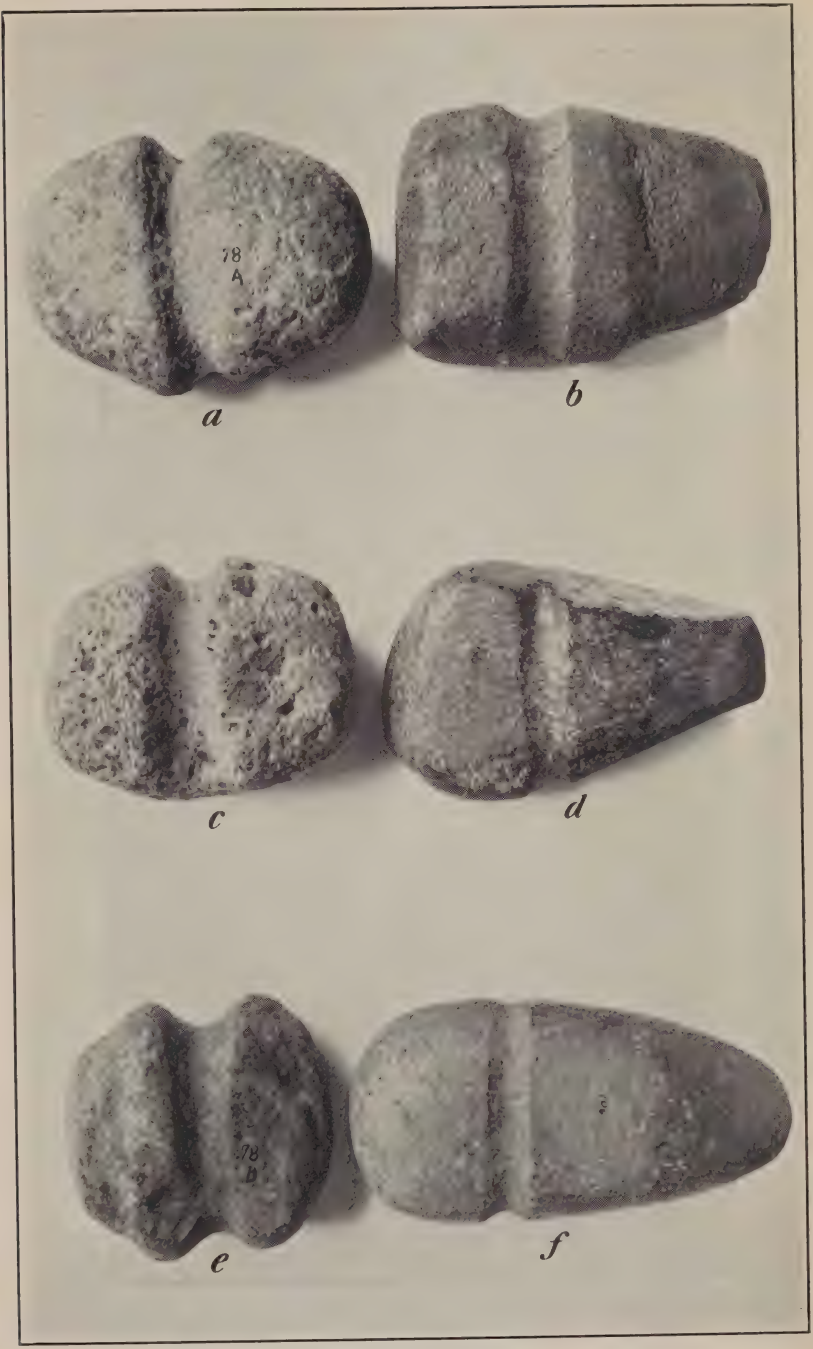
Bone Scraping Tools.



Metates and Manos.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A
a
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B
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STONE AXES.

of different manos. The trough-type metates were mounted on three stones, one at the grinder's end and two at the open end, such as shown in plate 19, *a*, Part I, and occupied a position midway between the fire pit and one wall of the chamber. The trough-type metate ranged from 1 foot 9½ inches to 2 feet (54.61 to 60.96 cm.) in length, 1 foot 2 inches to 1 foot 5 inches (35.56 to 43.81 cm.) in width, and 3 to 5 inches (7.62 to 12.7 cm.) in thickness. Trough lengths are from 1 foot 1 inch to 1 foot 3 inches (33.02 to 38.1 cm.), widths are 8½ to 10 inches (21.59 to 25.4 cm.), and depths 1¾ to 2¼ inches (4.44 to 5.71 cm.).

Judging from the fact that only a portion of one mortar was recovered, little use was made of that type of grinding or pulverizing article in this district. The single fragment indicates that the object had a rough, unfinished exterior and that the interior had little use. Nothing that might serve in the capacity of a pestle was found. Mortars were more common in regions to the south and west than they were in the Anasazi province proper and seem to occur in sites in the latter where influences from those sections were most marked.

There are several forms of ax heads. All are of the grooved variety, most have the groove completely encircling the stone but on a few it is present on three sides only. The latter is the so-called three-quarter type. One group has long bits or cutting edges (pl. 40, *b*, *d*, *f*). Another series has medium bits, (pl. 41, *b*; pl. 42, *a*). There is also a group with short, stubby cutting edges (pl. 41, *a*, *c*). Some of the long-bitted examples have a pronounced tapering of the bit to a narrow cutting edge, as illustrated by *d*, plate 40. This feature is also present on some of the medium-length bit forms (pl. 41, *b*). The other examples in these two groups have a long sweeping curve to the bit and wider cutting edges, as shown by *a* and *c*, plate 41. The ax heads in general were made from two shapes of stones. One from tabular blocks and the other oval or elliptical boulders. The tools made from the oval stoves have rounded bases, like *d* and *f*, plate 40, while those fashioned from tabular blocks have flattish bases, like *b*, plate 40; *a* and *c*, plate 41. The three-quartered groove axes are usually considered as a southern form, while those with the groove entirely encircling the stone are regarded as northern. The short-bitted stubby type is characteristic of the Little Colorado region, although examples are found elsewhere. The long-bitted with full groove are widespread in their distribution and at present it is difficult to say in what section they are most typical. An occasional specimen has two complete grooves and a basal notch to facilitate hafting (pl. 42, *a*). This type also had a wide distribution, although it does not seem to have been particularly numerous in any region. The large specimen (pl. 41, *e*), is the same shape as some of the axes, but it more likely served as a hoe rather than a chopping instrument. A certain amount of polish produced by the rubbing of a handle is present on one side in a position that indicates that the handle was attached in such a way that the cutting edge was cross-wise to it instead of being in the same line. This type of hafting was common on adzes, picks, and hoes, hence the conclusion that this specimen was used for digging purposes.

There was not a wide range of sizes in the long-bitted axes. The lengths were from 5⅝ to 6⅝ inches (14.28 to 16.82 cm.), widths 3¼ to 3¾ inches (8.25 to 9.52 cm.), and thickness from 1¾ to 2⅝ inches (4.44 to 6.66 cm.). The medium-bitted series have lengths from 4½ to 5 1/16 inches (11.43 to 12.85 cm.), widths from 3 to 4 inches (7.62 to 10.16 cm.), and thicknesses from 1¾ to 2¾ inches (4.44 to 6.98 cm.). The short-bitted type ranges from 3½ to 3⅞ inches (8.89 to 9.84 cm.) in length, 3 3/32 to 3 9/16 inches (7.91 to 9.04 cm.) in width, and 1⅜ to 2⅝ inches (3.49 to 6.66 cm.) in thickness.

Mauls occur in two general types. The cylindrical form is the commonest (pl. 40, *a*, *c*; pl. 41, *d*). The striking surfaces in this group are either curved, as in the case of those illustrated, or flattened. Some of the ends show the effects of considerable battering. Most of the specimens in this series have a complete groove, but a few have what might be called a seven-eighths type as there is only a small break in it on one side. The other variety of maul is a tabular-shaped object with flat sides and short striking ends (pl. 40, *e*; pl. 42, *b*). The latter also has a basal notch to make possible more secure fastening of the handle. On this type the groove is complete. The ends are either slightly curved or comparatively flat. Some of the mauls are fairly large and heavy, others are small and light. The heavier forms probably functioned in the driving of pegs and posts and the quarrying of slabs from the rock exposures along the edge of the ridge on which most of the ruins are located. The smaller forms no doubt served for many purposes comparable to those of a modern hammer, except that there were no nails to drive, and may on occasion have answered the need for a weapon of offense. The cylindrical forms had lengths from 3 to 7½ inches (7.62 to 19.05 cm.), widths from 2¼ to 5⅝ inches (5.71 to 14.28 cm.), and thicknesses from 2⅛ to 5⅜ inches (5.39 to 13.65 cm.). Most of them approximate, but do not attain, the circular cross section. The stubby, tabular type of maul ranges from 3½ to 3⅞ inches (8.89 to 9.84 cm.) in length, 3⅝ to 4 inches (9.20 to 10.16 cm.) in width and 2½ to 2¾ inches (6.35 to 6.98 cm.) in thickness.

Hammer stones to be held in the hand are roughly oval or rectangular-shaped stones. Sometimes they were partially dressed and shaped for the purpose, again they received no particular attention but were used in their natural state. The ends of most of these objects show the effects of battering. The two specimens (pl. 42, *c*, *d*) are good examples of the two forms. Some effort was expended on *c* to make a suitable implement out of it. The ends were pecked into rounding contours and there was a little chipping along the sides. The rounded upper end fits the palm better than would be the case with an unmodified stone. The upper end on *d* has a naturally smooth surface that would not be too hard on the hand of the user and that may account for the fact that little was done to it. Implements of this general type probably functioned in knocking flakes from larger nodules, for pecking and shaping building blocks, and for dressing grinding stones. Most of the hand hammers are granite pebbles or pieces of petrified wood. There is nothing to indicate that such was the case, but it is possible that the users of these tools, like some of the later Indians, may have on occasion protected their palms with a piece of skin from an animal hide or a pad of folded fabric when pounding with such stones. The hammer stones in the collection have a length range from 3⅝ to 6½ inches (9.20 to 16.51 cm.), widths from 2½ to 4¼ inches (6.35 to 10.79 cm.), and the thicknesses from 2¹⁄₁₆ to 3¼ inches (5.23 to 8.25 cm.) The weight range is 18½ ounces to 27½ ounces (0.524 to 0.779 kg.).

The stone pipes are of the short-tubular type to be used with a bone bit or mouthpiece. They were made from rhyolite and have a good polish on their exterior surfaces. In contrast to the clay forms, the sides of these specimens have a slightly concave taper and the base is flat rather than pointed. The hole in the base is much larger than in the clay cloud-blowers. Two typical examples are illustrated on plate 32, *c* and *d*. An unfinished pipe, in fact one that was little more than started, is shown as *f*, plate 32. The cylinder *e*, plate 32, may possibly represent the beginning stages of a pipe, but that is questionable. The indentations in the ends are similar and appear finished. The object suggests a roller rather than the preliminary form of some other article. In contrast to the others, both complete and unfinished, it is of sandstone. What its purpose may have been is not known. The stone pipes illustrated here are more of a southern than a northern form, possibly they are one of the components in the Little Colorado complex. In the southern parts of the province they were often made from lava, but there were no specimens from that material in the Whitewater sites. Pipes of this type range from 1½ to 2½ inches (3.81 to 6.35 cm.) in length, 1⅛ to 1¾ inches (2.85

to 4.44 cm.) in diameter at the bowl end, ⅞ to 1¼ inches (2.22 to 3.17 cm.) in diameter at the bit end. The bowl is approximately two-thirds of the total length.

Stones of the so-called paint-palette type are rare in the Whitewater District. These generally are tabular pieces of stone with flat or slightly concave sides and straight edges. The borders are usually decorated with incised lines in a simple rectilinear pattern. As a rule they were made from sandstone and slate. Pigment used in painting designs, possibly that intended for personal adornment also, was mixed on them and their surfaces generally exhibit color stains derived from that source. These objects seem to be a southern product, to stem from the Mogollon and Hohokam regions. Most of the Whitewater forms are unshaped fragments from standstone slabs. They have a small depression pecked in one side and the minerals used in the preparation of paint were pulverized and mixed in them. They served the double capacity of a mortar and pigment bowl. None of the well-shaped types are represented. There is one problematical object in the collection that may have been a palette, although it is possible that it may have had some other function. It may perhaps have been for ceremonial purposes. The article is a tabular triangular-shaped piece of sandstone with a rounded apex. It is a very soft stone and a definite depression was cut into it to form a cavity in one side (pl. 43). There is a slight red stain, apparently from red ocher, in part of the cavity suggesting use as a palette. The border along one side of the cavity, the lower left-hand corner in the photograph, is worn away in a manner to indicate the wiping of stiff brushes on its edge. These abrasions are in the position that a person holding the stone in the left hand and using a brush with the right would naturally use in removing too much paint from a brush and consequently add to the suggestion that it was a palette. On the other hand, there is no trace of pigment in the worn edge and the fact that the stone is rather porous and would tend to absorb anything coming in contact with it argues against the palette idea. For this reason it is suggested that it may have had some other function. Despite the uncertainty of its purpose, the object is an interesting example of what could be produced in stonework. It is late in the series, coming from one of the last of the third-unit burials,[86] and dates from the boundary phase between Developmental and Great Pueblo. For the main Anasazi centers it would correlate with Great Pueblo. The stone is 10 17/32 inches (26.72 cm.) long, 6 23/32 inches (17.13 cm.) wide at the bottom, and 1 3/16 inches (3.01 cm.) thick.

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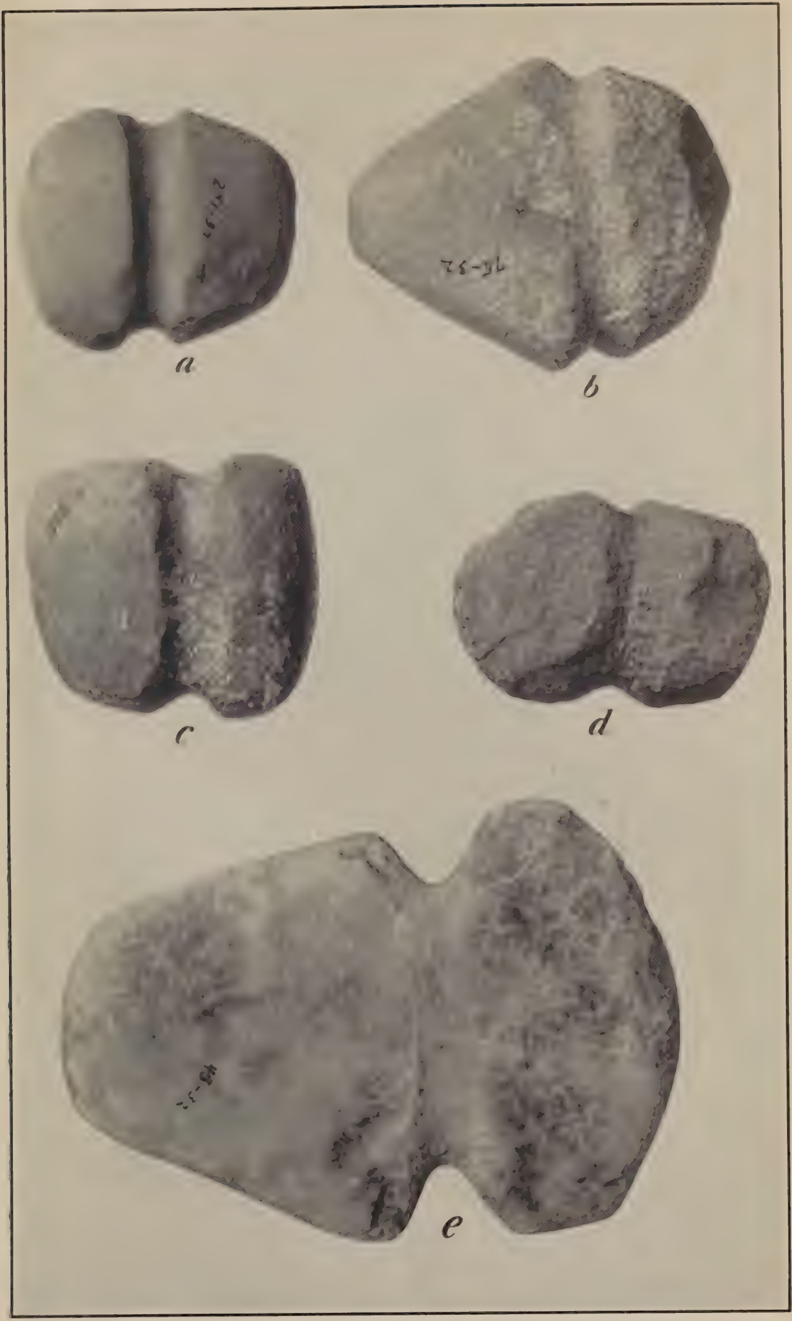
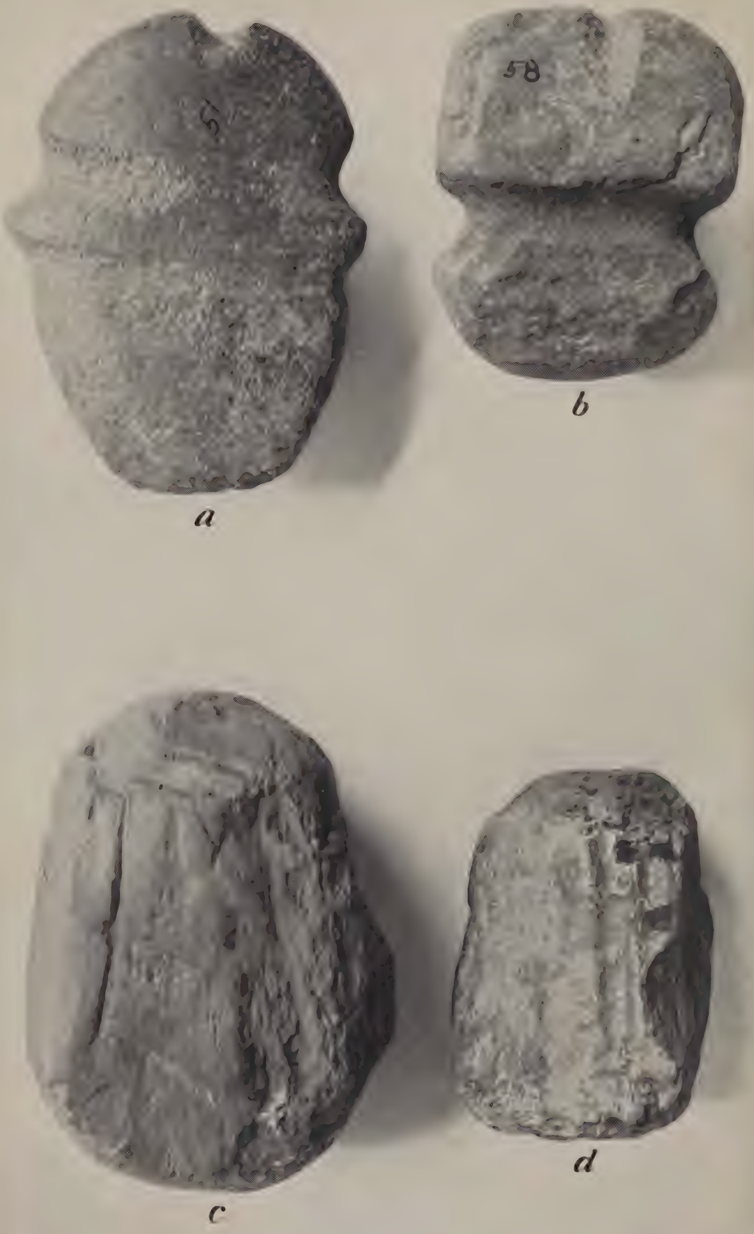
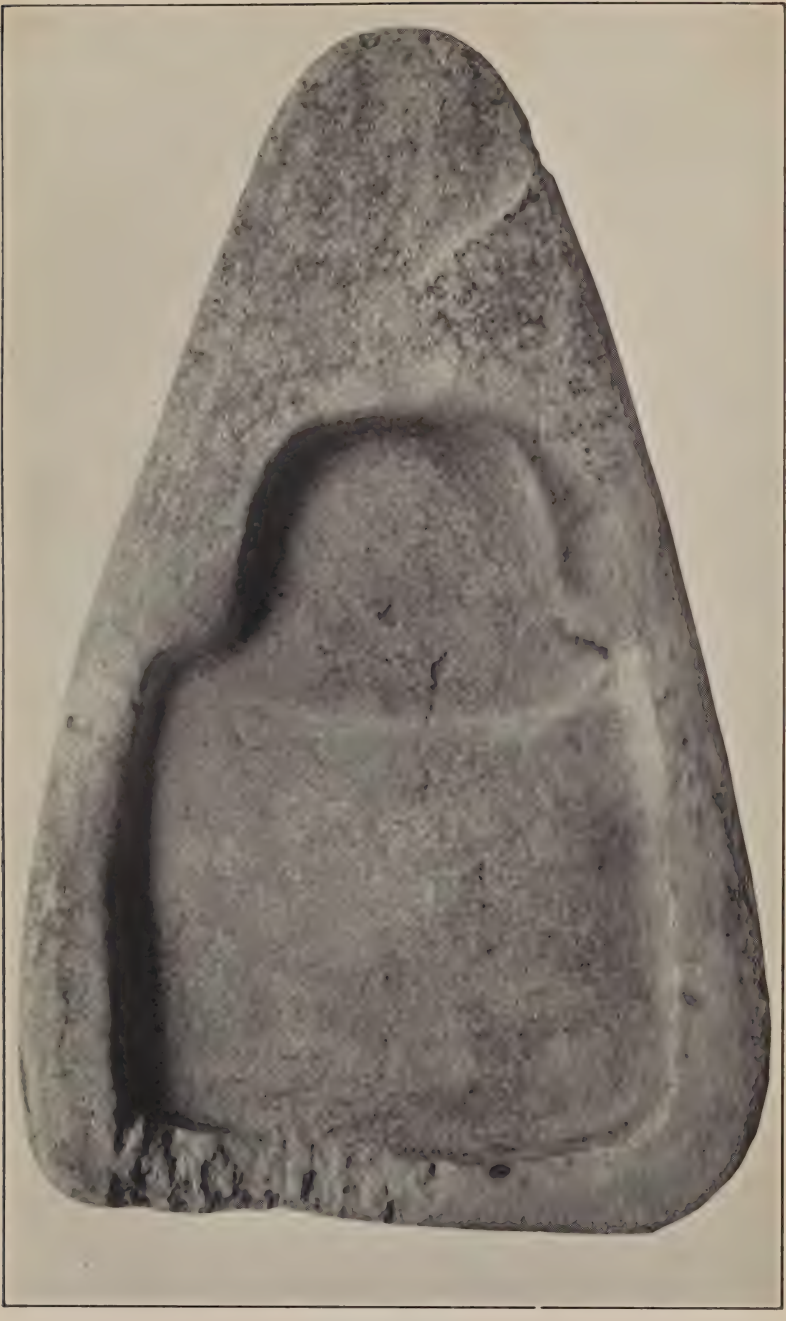
[86] See Part I, pp. 239–240.



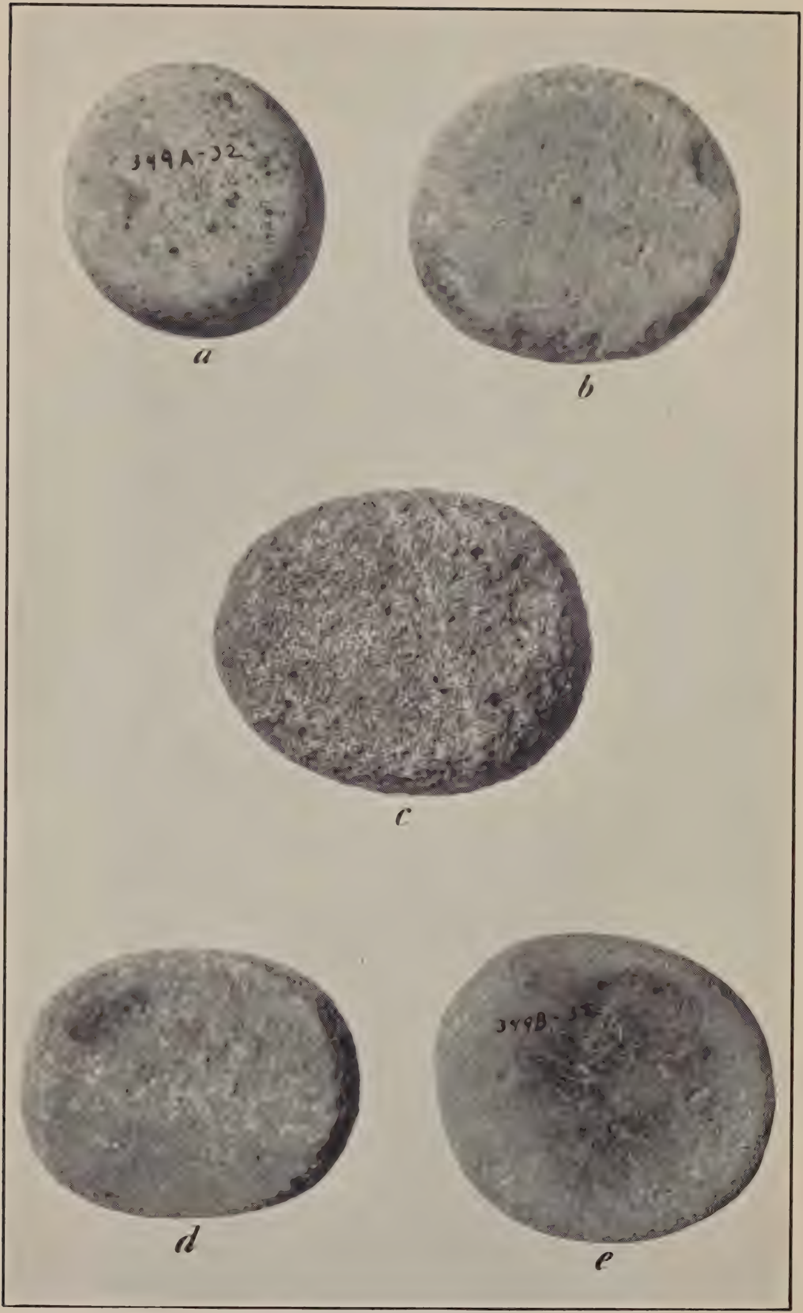
AXES, MAUL, AND HOE.



AX, MAUL, AND HAND HAMMERSTONES.



STONE PALETTE.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e

SMOOTHING STONES.

There is one group of stones that bears close resemblance to the manos used on the metates, but these objects apparently had some other function. In contrast to the manos they are smoothed and finished on all sides and edges and are more regular in outline. Their size range is smaller than that for the manos, although some are slightly thicker. They occur in circular and oval forms with flattened cross section. The faces are more nearly flat than those on the manos, and in most cases are much smoother (pl. 44). There was nothing to indicate their purpose, but it seems likely they were used for smoothing the plaster on the floors and walls of the rooms in the houses. Similar stones are employed for that purpose on occasion by some of the modern Indians. The circular forms of these stones range from 3¼ to 4⅜ inches (8.25 to 11.11 cm.) in diameter, from 1⅝ to 2⅛ inches (4.12 to 5.39 cm.) in thickness. The oval or elliptical examples have lengths from 4¼ to 4¾ inches (10.79 to 12.06 cm.), widths from 3⁵⁄₁₆ to 3⅞ inches (8.41 to 9.84 cm.), and thicknesses from 1¾ to 2½ inches (4.44 to 6.35 cm.).

Chipped-stone tools consist of cutting edges, scrapers, drills, and arrowheads. Most of the cutting edges and scrapers are a nondescript lot of flakes with one edge or a portion of an edge chipped to make the working part of the tool. There is nothing distinguishing about them. Well-shaped side scrapers, end scrapers, and the snub-nosed forms frequently found in sites farther east and north are not represented. There is one group of knife blades that were made to be hafted that shows good workmanship and knowledge of the chipping technique. The blades are fairly broad and thick and the ends are rounded. An example of this type is *a*, plate 45. A simpler style of flake knife, one that was made to be held in the fingers instead of being fitted to a handle, is usually worked on one side only, although the bulb of percussion was occasionally reduced in size by the removal of a few flakes. This type is illustrated by *a*, plate 46. Definitely shaped, yet sparingly chipped blades that approximate a diamondlike outline supplied the need for a cruder form of knife. These (pl. 46, *b*) also were intended for hafting. Drills were a long-oval shape and roughly circular or elliptical in cross section (pl. 46, *e*). They probably were mounted in a wooden or bone handle. There were no examples of the T-shape or those with a broad base that could be held in the fingers without the aid of a handle.

The projectile points have a variety of shapes, and it is difficult to decide which were for arrows and which for spears in the case of the larger specimens. There are examples of the broad-based type with side notches for hafting (pl. 45, *c*, *d*, *e;* pl. 46, *c*). Forms with a broad tang and rounded base (pl. 46, *d*), the notches being comparatively shallow, are not as common although there is a good representation of the type in the series. Both this and the preceding form are characteristic of the later stages of the Developmental period in the Whitewater District. They probably are also the typical forms for the Great Pueblo horizon, but this is not certain owing to the lack of work in the remains of that stage. The typical point for the early part of the Developmental phase is one with oblique notches and downraking barbs (pl. 45, *i*; pl. 46, *h*). Next in importance is a modification in which the base of the tang is curved and expanding (pl. 46, *m*). It is possible that this type led to the one with only a slightly expanding tang and less oblique notches (pl. 45, *h*). There was no correlation between the style of point and the material from which it was made. The same kind of stone is found in all the varieties of points, yet there are tendencies for one to be more popular at certain stages than another. Chalcedony and obsidian show a higher percentage in the early part of the Developmental than in the later stages. Chert and quartzite occur in about the same proportion throughout, but there was greater use of petrified wood and jasper in the latter part of the occupation. The finest specimens are those made from obsidian and chalcedony. This is attributable, no doubt, to the fact that this material works better than some of the others and not to greater skill on the part of the workmen making them. One curious feature about the small points, the forms frequently referred to as bird points (pl. 46, *j*, *k*, *l*) is that many of the edges have been ground. Why this should have been done or what advantage such a feature might have is not known. The edges of the tang were often ground to prevent cutting the lashings that held the stone to the arrow or spear shaft, but smoothing the edges on the penetrating surfaces would tend to reduce rather than increase the effectiveness inasmuch as a thick, dull border was the result. Had the faces been tapered to produce a thin, although smooth, edge the penetrating quality might have been bettered.

The broad, thick knife blades with rounded ends range from 2$\frac{1}{16}$ to 3 inches (5.23 to 7.62 cm.) in length and a basal width of 1 to 1$\frac{3}{4}$ inches (2.54 to 4.44 cm.). The diamond-shaped blades have a length range from 1$\frac{5}{8}$ to 2$\frac{1}{4}$ inches (4.12 to 5.71 cm.) and a maximum breadth from $\frac{7}{8}$ to 1$\frac{1}{4}$ inches (2.22 to 3.17 cm.). The simple flake knives are from 1$\frac{1}{2}$ to 2$\frac{1}{4}$ inches (3.81 to 5.71 cm.) in length and have a maximum breadth range from $\frac{3}{4}$ to 1$\frac{1}{4}$ inches (1.90 to 3.17 cm.). Drills are from 1$\frac{1}{2}$ to 1$\frac{3}{4}$ inches (3.81 to 4.44 cm.) in length and have a maximum diameter of $\frac{3}{8}$ to $\frac{1}{2}$ inch (9.52 to 12.7 mm.). The broad-base projectile points with horizontal side notches have lengths from $\frac{45}{64}$ of an inch (1.78 cm.) to 1$\frac{15}{16}$ inches (4.92

cm.), and maximum breadths from $\frac{9}{16}$ of an inch (1.42 cm.) to $\frac{3}{4}$ of an inch (1.90 cm.). Forms with the broad tang and rounded base vary from $1\frac{3}{4}$ to $2\frac{1}{4}$ inches (4.44 to 5.71 cm.) in length and from $\frac{5}{8}$ to $\frac{7}{8}$ of an inch (1.58 to 2.22 cm.) in width at the notches. The points with downraking barbs and narrow tang have lengths from $\frac{3}{4}$ of an inch (1.90 cm.) to $2\frac{13}{32}$ inches (6.10 cm.), and widths at the base of the barbs from $\frac{1}{2}$ to $\frac{29}{32}$ of an inch (1.27 to 2.30 cm.). The type with oblique notches and curved and expanding tang varies from $\frac{23}{32}$ of an inch (1.82 cm.) to $1\frac{9}{16}$ inches (3.96 cm.) in length and from $\frac{19}{32}$ to $\frac{3}{4}$ of an inch (1.50 to 1.90 cm.) in width at the barbs. Points with less oblique notches and only slightly expanding tang range from $\frac{45}{64}$ of an inch (1.78 cm.) to $1\frac{29}{32}$ inches (4.80 cm.) in length and from $\frac{11}{16}$ of an inch (1.74 cm.) to $1\frac{1}{32}$ inches (2.60 cm.) in width at the barbs. In some studies the weight of points is determined and with this as a basis they are more or less arbitrarily assigned to the category of arrow or spearheads. For example, all points weighing less than 32 grains troy (2.07 gm.) are considered arrowheads and all those above that figure are classified as spearheads. As a matter of fact arrowheads used in some sections of the country are larger and heavier than examples from other sections that are known to have been used on spears, hence the size and weight criteria are not altogether satisfactory. None of the points in the present series were weighed. All could have been used on arrowshafts and many would have functioned satisfactorily at the ends of spears. For that reason they are listed merely as projectile points.

Included in the collection is a curious lot of small stones that apparently had no practical purpose. What their function may have been is not known. It is possible they were toys or trinkets or merely the products of haphazard whiling away of time during which the makers pecked away at stone instead of whittling bits of wood in the manner of modern loafers. Two of these objects suggest miniature mauls (pl. 47, *a* and *d*). They could have been toys representing those tools or they might have functioned as toggles on the end of a cord. The smaller one (*a*) has a total length of $\frac{15}{16}$ of an inch (2.40 cm.) and diameters of $\frac{5}{8}$ and $\frac{3}{4}$ of an inch (1.58 and 1.90 cm.). The larger one has a length of $1\frac{5}{8}$ inches (4.12 cm.) and diameters of $\frac{7}{8}$ and $\frac{13}{16}$ of an inch (2.22 and 2.06 cm.). There are a number of simple stone balls such as *j*, plate 47. They are about the same size and character as those used by the Zuñi Indians in their hidden ball game[87] and the workmen insisted that they were for that purpose. This game is not played in the manner of modern games, that is for pleasure only, but is part of a ceremony for rain and a petition for abundant crops. Several of the older men from Zuñi visited the excavations on various occasions and when they were shown the stone balls exclaimed "I′yänkolo‘we," which is the name for the hidden ball game. While it is not known that these earlier peoples had similar beliefs and ceremonies, it seems logical to conclude that they did and that the present specimens were for use in that connection. Balls of this type in the series have diameters ranging from 1 5/16 to 1 9/16 inches (3.33 to 3.96 cm.). None are perfect spheres.

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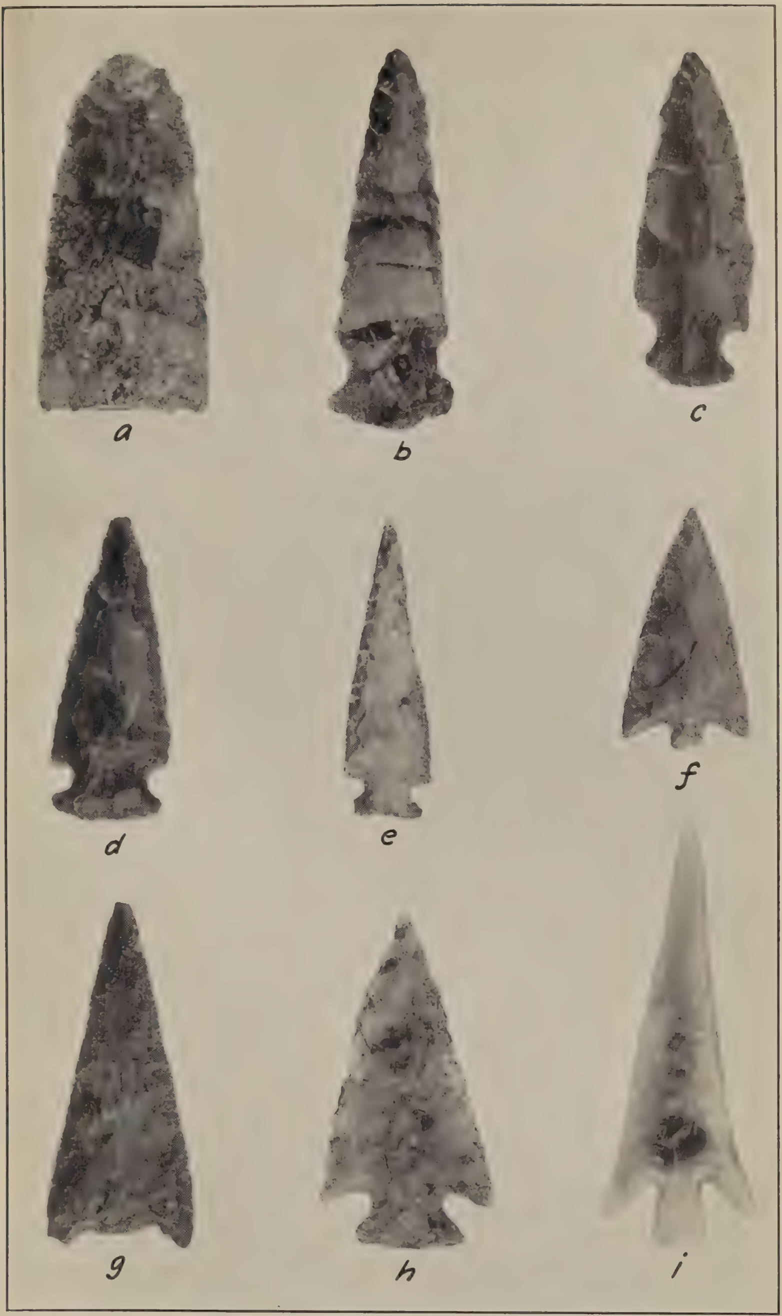
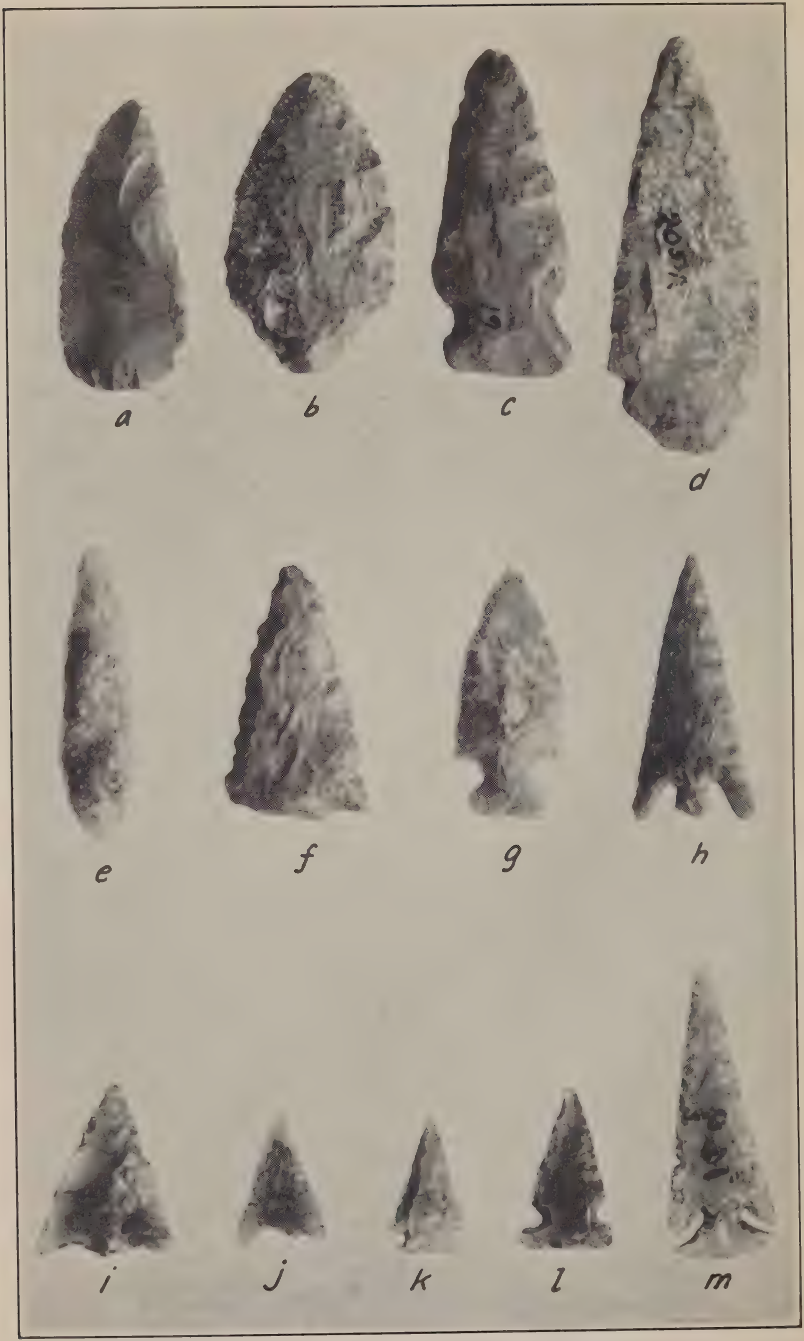
[87] Stevenson, 1904, pp. 333–340.

There are small cups (pl. 47, *c*) that could have functioned as paint receptacles, but which contain no traces of pigment. They vary from 1 1/16 to 1 1/4 inches (2.69 to 3.17 cm.) in diameter and have heights of from 5/8 to 7/8 of an inch (1.58 to 2.22 cm.). Spherical or oval-shaped stones with incised grooves (pl. 47, *h* and *i*), are rather common. Some are incised in a manner to suggest the segments of a melon. On others the incision is a spiral running from one side to another. The grooves on others follow no plan whatsoever. There is no explanation for these objects. Neither the Zuñi nor Navaho workmen could or would offer a suggestion as to their function. Similar incisions are present on cylindrical-shaped stones, such as *g*. The spherical specimens in this group do not have a marked size range. The diameters average (none are perfect spheres) from 1 1/16 to 1 1/4 inches (2.69 to 3.17 cm.). The oval forms have long diameters from 1 1/8 to 1 7/16 inches (2.85 to 3.65 cm.) and short diameters from 1 inch (2.54 cm.) to 1 3/8 inches (3.49 cm.). The cylindrical examples have lengths from 1 5/16 to 1 5/8 inches (3.33 to 4.12 cm.), and diameters from 7/8 to 1 1/4 inches (2.22 to 3.17 cm.). There are plain cylinders with comparatively flat ends, like *k*, plate 47, that fall within this same size range. Other oval-shaped stones have holes drilled in their surfaces. In some cases they were placed in a hit or miss fashion and in others follow some kind of pattern. The example *e*, plate 47, has two placed in such a way as to suggest eyes. Specimens in this group have long diameters of 1 5/16 to 1 9/16 inches (3.33 to 3.96 cm.) and short diameters ranging from 1 1/16 to 1 5/16 inches (2.69 to 3.33 cm.).

Another series in this group of objects consists of tabular stones, light gray to almost white in hue, with spots painted on them in red ocher. Two examples are shown in plate 47, *m* and *n*. The spots are placed on all sides and on some of the specimens also appear on the ends. There is nothing to indicate the purpose of these specimens and the Indians again could offer no explanations. The objects vary in length from 1 3/4 to 2 5/8 inches (4.44 to 6.66 cm.), from 1 1/16 to 1 1/2 inches (2.69 to 3.81 cm.) in width, and from 1 to 1 1/8 inches (2.54 to



Knife Blade and Projectile Points.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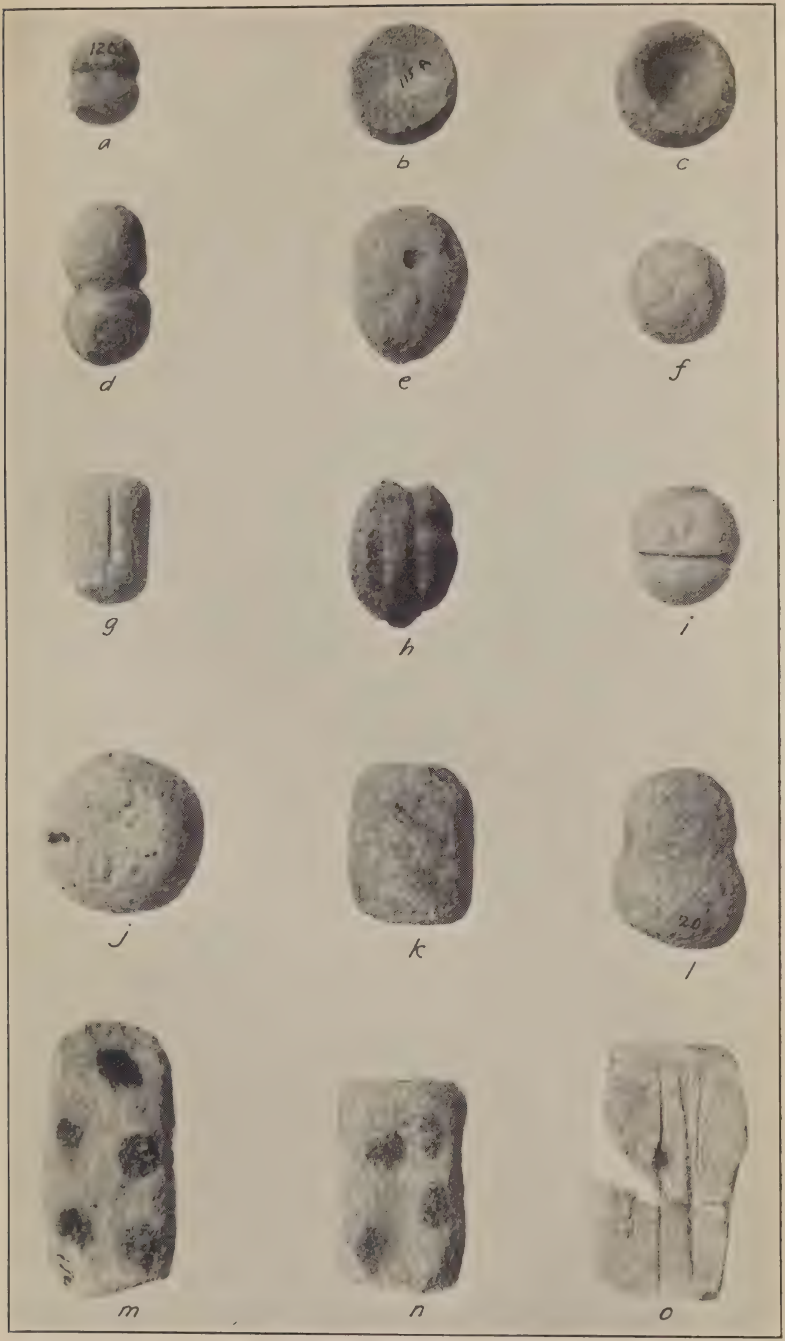
KNIVES, DRILL, AND PROJECTILE POINTS.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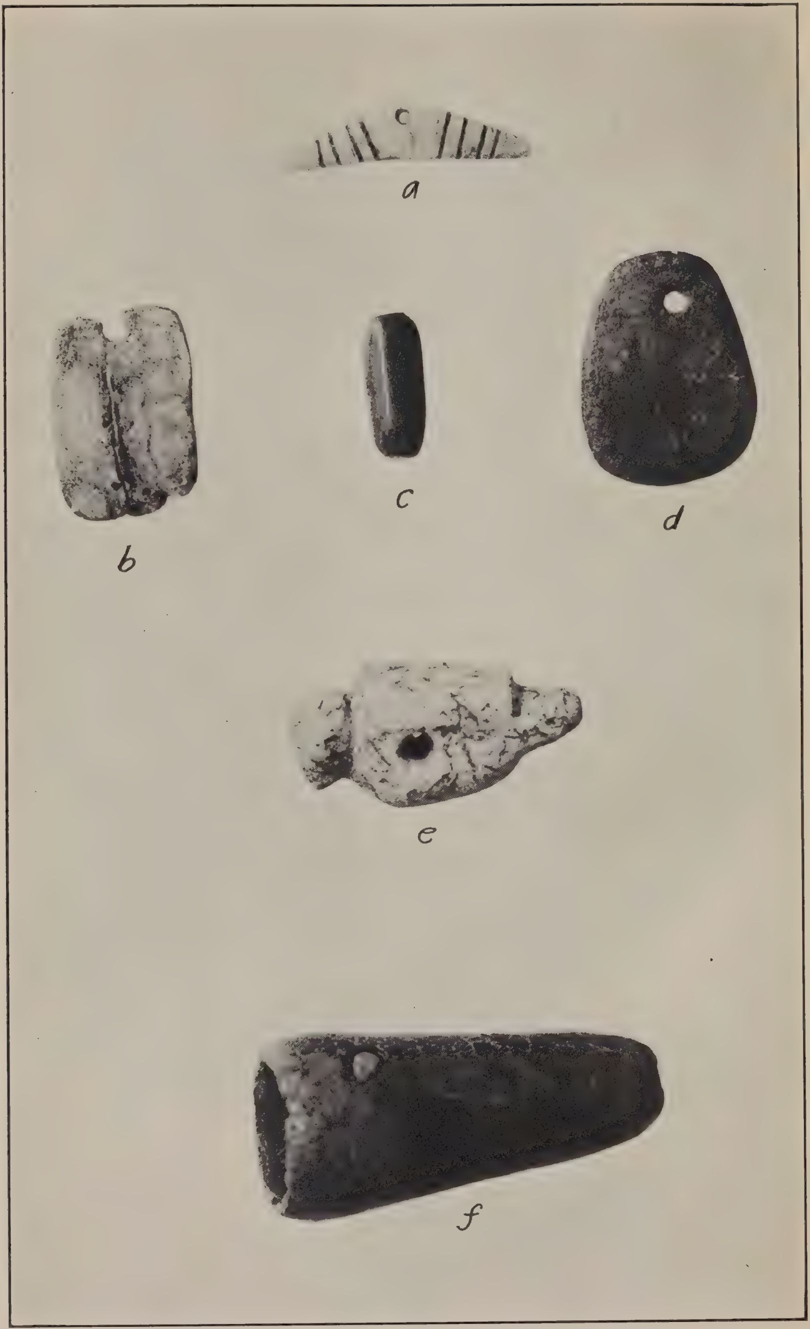
Small Objects of Stone.



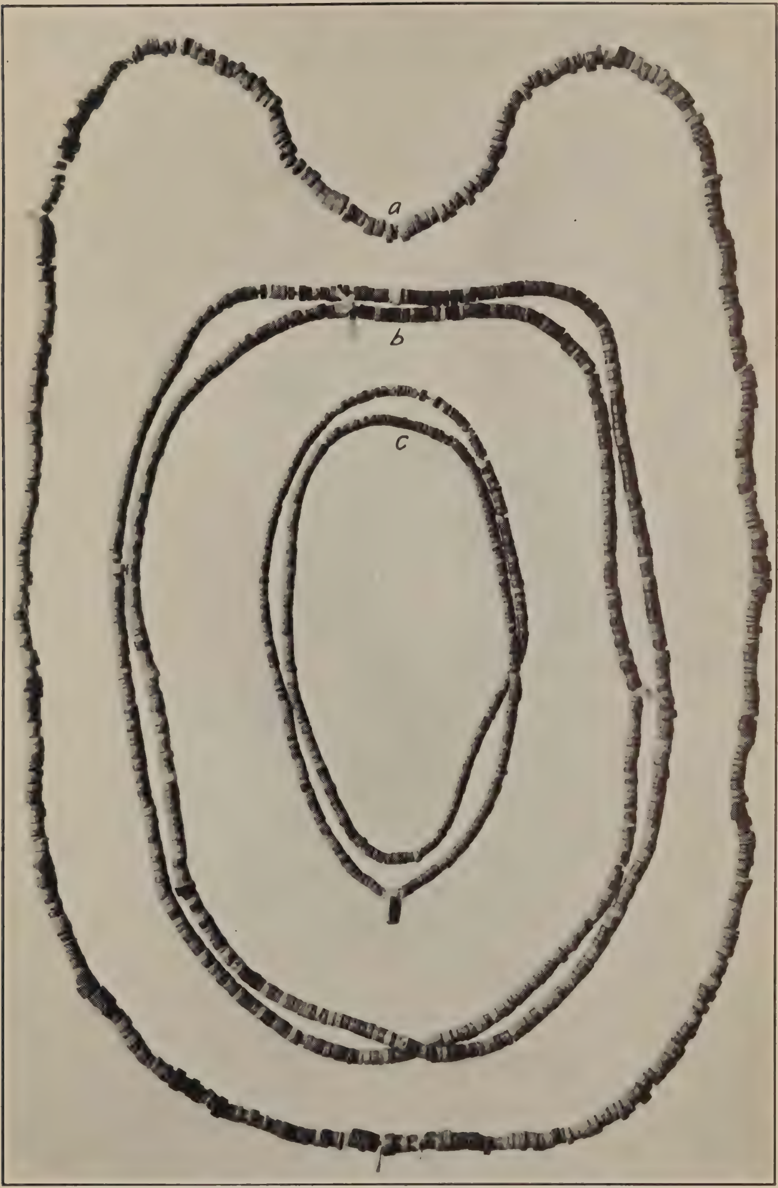
Shell and Stone Ornaments, and Clay Pipe With an Inset of Turquoise.

2.85 cm.) in thickness. Of somewhat similar nature are tabular stones with incised markings on them, as illustrated by *o*, plate 47. Most of the examples have only series of straight lines cut into their surfaces. A few fragments from broken specimens suggest that a simple geometric pattern had been scratched on them, but there is not enough remaining to show the exact nature of the design. Objects of this type have a size range of from 2½ to 3 inches (6.35 to 7.62 cm.) in length, from 1½ to 1⅞ inches (3.81 to 4.76 cm.) in width and 1 to 1¼ inches (2.54 to 3.17 cm.) in thickness.

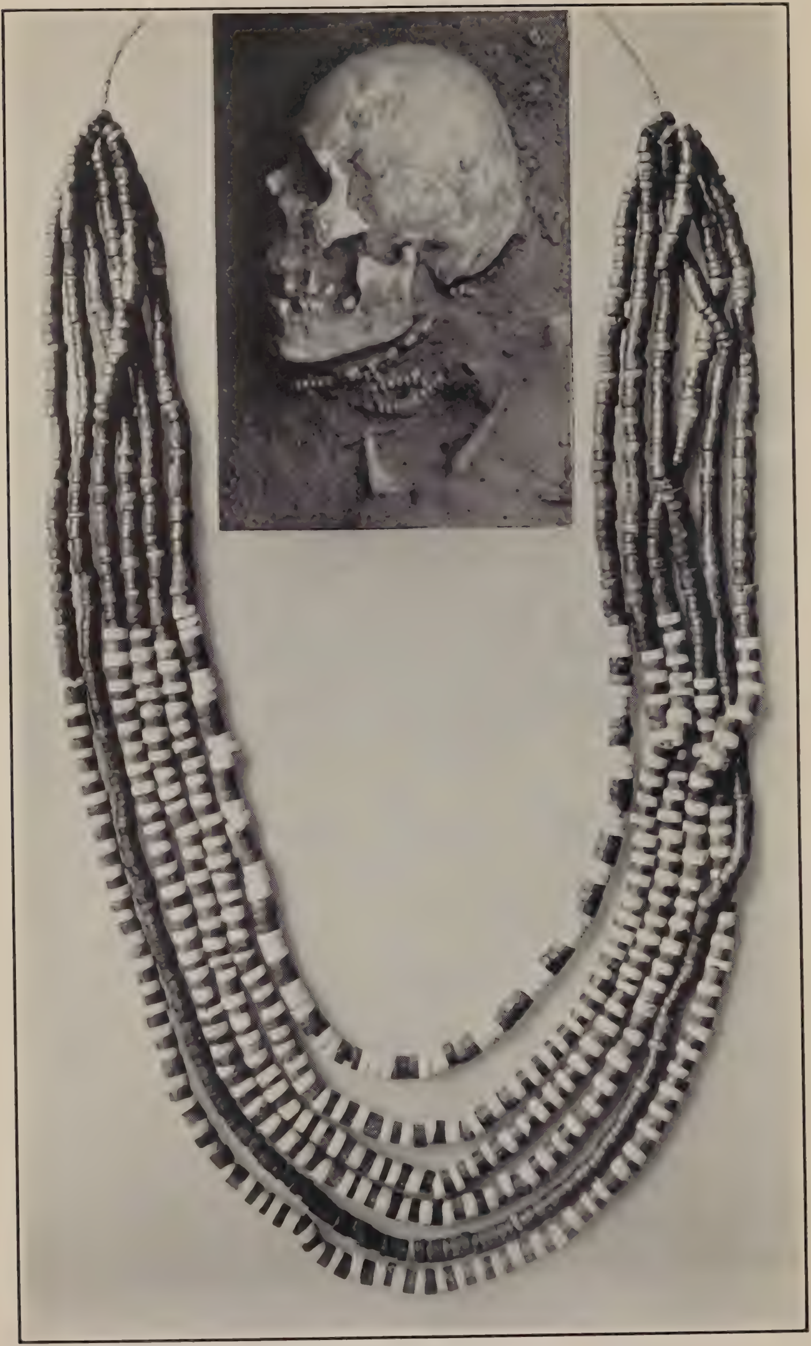
Curiously-shaped natural formations were collected and saved by the inhabitants. Numerous caches of such objects were encountered in the digging. Most of these stones are concretions, although there are a few waterworn pebbles. Concretions were particularly favored by the later Indians who used them as fetishes, lucky stones, and charms. The Zuñi consider them representations of birds and animals, even regard them as pieces of the gods, their implements, weapons or ornaments. It is not improbable that the earlier groups had a similar conception of them and treasured them for that reason. Various forms of fossils were also collected and saved. Fragments from brachiopods and crinoids were found in several of the houses. One cache contained a number of shark teeth and another produced two teeth from one of the Pleistocene horses. There does not appear to have been any attempt to use these articles as ornaments. In some localities similar specimens are found in which there are perforations for suspension and occasionally one is found associated with beads in such a way as to indicate that it was strung as part of a necklace or bracelet.

Stone ornaments were limited to a few forms. One is that of the pendants used on strings of beads (pl. 48, *d*), small birds (pl. 48, *e*) also used as parts of necklaces or bracelets, and the stone beads. Pendants were made from a grayish-colored shale, from a red ferruginous shale, from gypsum, and from turquoise. Judging from the popularity of the latter in the case of the modern Indians in the region, it probably was held in high esteem by the occupants of the Whitewater District. Specimens made from it are not numerous, but they constitute a good percentage of the group as a whole. The bird figures were made from gypsum or alabaster. They exhibit a high degree of workmanship and an excellent conception of the anatomy of a bird. The surfaces are somewhat weathered, because of the softness of the material from which they were made, but even this does not detract from their artistic merit. Similar objects are found rather frequently in the Little Colorado region. Many of them are made from harder stone, however, and as a consequence are better preserved. The beads are mainly of the flat-disk type of varying degrees of thickness (pl. 49). They were made from gypsum, to obtain the white, a gray to black shale, red shale similar to that in the pendants, and turquoise. The latter were not numerous and were scattered sparingly along the string with the other forms. The only example of all turquoise beads found was a small strand around the wrist bones of one of the skeletons.

As a general rule it is not possible to tell what types of necklaces were made from the beads found in an excavation or accompanying a burial. On rare occasions they occur in undisturbed positions and despite the decay and disappearance of the string can be retrieved in their proper order by rethreading before removal from the earth. Three of the Whitewater District burials were ideal for this purpose and necklaces were obtained in the form that they had originally possessed. From around the neck of one skeleton came two strands. One consisted of a single long loop with a small turquoise pendant at the bottom (pl. 49, *a*), the other was also a single loop but had been worn doubled (pl. 49, *b*). On the wearer the combination would give the appearance of one long strand and two shorter ones. The beads are mainly gypsum and shale with a few turquoise examples occurring sporadically at various places. There is no particular order in the arrangement of the light and dark-colored beads. Another skeleton had a single strand looped twice about the neck. In this case there was also a small turquoise pendant in the center at the bottom. The beads are gypsum, red and gray shale, and a few scattered turquoise. The beads in this string are smaller and the strand is shorter than the other two (pl. 49, *c*). The finest example, however, is a choker type of necklace consisting of six strands of dark shale and gypsum beads. The fact that there had been no disturbance of the grave in which it was found made possible its restoration (pl. 50), and gives an accurate illustration of one type of ornament worn in the late 900's in the Whitewater District. In this case there was definite arrangement of the different colored beads. The upper ends of all of the strands, the portions that would be at the back of the wearer's neck, are composed of the shale beads. The light-colored gypsum examples were reserved for the front of the collar and were alternated with the dark forms to produce a pleasing contrast. The top strand has recurring sets of threes except for two places where there are only two of the gypsum type. The three succeeding strands have alternating single beads in the light and dark. The fifth strand is composed entirely of the shale forms. Most of them are a good dark shade, but a few are a light gray. The bottom strand again repeats the alternating single beads. It was a fortunate circumstance that one of the Zuñi laborers who had a number of years' excavating experience was the one to find this

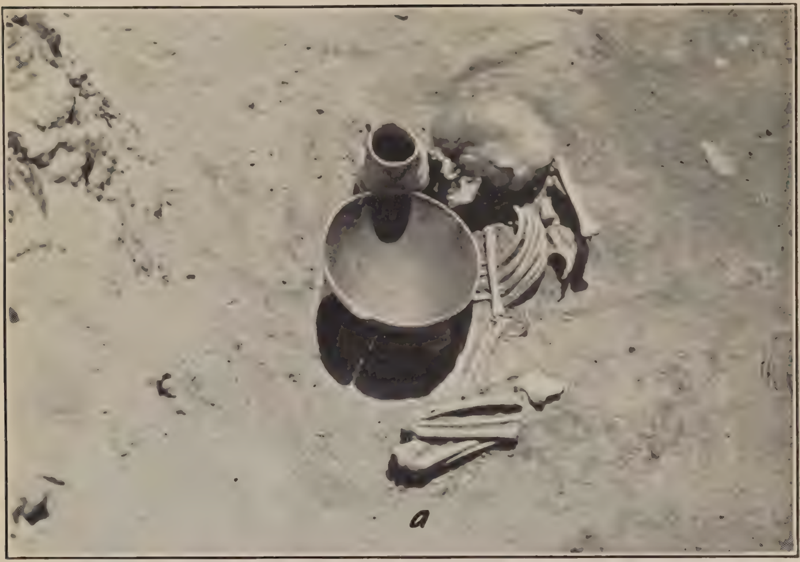


STONE BEADS.

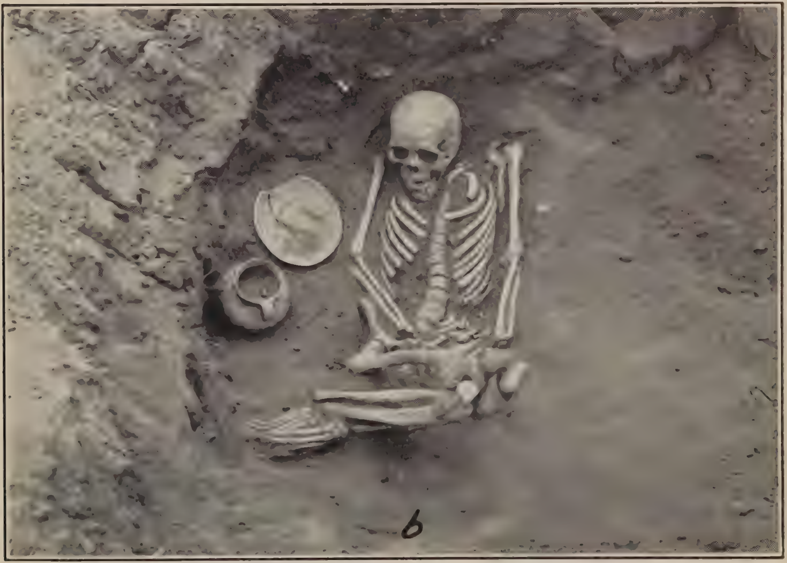


COLLAR STYLE OF NECKLACE.

Inset shows specimen in situ before removal.



a, Young child.



b, Adult.

TYPICAL BURIALS.

burial because the least bit of carelessness or slightest inattention would have ruined this piece of evidence on one type of necklace worn by the ancient Pueblo Indians.

The small cylindrical stone *c*, plate 48, is of a light-green nephritic stone. It was shaped by the rubbing process and has a high gloss. The object was found in one of the rubbish mounds in association with potsherds indicative of the end of the Developmental and beginning of the Great Pueblo stage. There was nothing to suggest its purpose, but it is so similar to one type of nose plug worn by peoples in regions farther south that it may well be such an object. Thus far there has not been much evidence of the use of articles of that nature in personal adornment in the Anasazi province. Occasional individuals, however, may have worn them. The object is 11/16 of an inch (1.74 cm.) long and 5/16 of an inch (.79 cm.) in diameter. If it actually was a nose plug, no doubt it was inserted in a hole drilled through the cartilage between the nostrils.

There is considerable variation in the sizes of the stone pendants. Those made from the gray-to-black shale range from 1/2 to 3/4 of an inch (1.27 to 1.90 cm.) in length, 1/8 to 5/8 of an inch (3.17 to 15.8 mm.) in width, and 1/16 to 3/16 of an inch (1.58 to 4.76 mm.) in thickness. The red-shale forms are slightly smaller with a length range from 3/8 to 5/8 of an inch (9.52 to 15.8 mm.), widths from 1/8 to 3/8 of an inch (3.17 to 9.52 mm.), and thicknesses from 1/16 to 1/8 of an inch (1.58 to 3.17 mm.). Gypsum pendants tend more to the circular forms than to the rectangular or pear-shaped and have diameters from 5/8 of an inch (1.58 cm.) to an inch (2.54 cm.), and thicknesses from 1/16 to 1/8 of an inch (1.58 to 3.17 mm.). The bird-shaped pendants do not differ much in size. Lengths are from 1 1/8 to 1 3/8 inches (2.85 to 3.49 cm.), widths across the wings are 9/16 to 11/16 of an inch (1.42 to 1.74 cm.), and body thicknesses from 5/8 to 11/16 of an inch (1.58 to 1.74 cm.). The beads show considerable range in the matter of thickness and diameter. Those in *a*, plate 49, have thicknesses from 3/64 to 9/64 of an inch (1.19 to 3.57 mm.), diameters from 9/64 to 15/64 of an inch (3.57 to 5.95 mm.), and hole diameters from 5/64 to 1/8 of an inch (1.98 to 3.17 mm.). Those in *b*, plate 49, are more regular and average 5/64 of an inch (1.98 mm.) in thickness, 11/64 of an inch (4.36 mm.) in diameter, and have an average hole diameter of 3/32 of an inch (2.38 mm.). The beads in *c*, plate 49, are much smaller and have an average thickness of 1/16 of an inch (1.58 mm.), a diameter of 1/8 of an inch (3.17 mm.), and a hole diameter of 1/16 of an inch (1.58 mm.). The beads in the collar (pl. 50) have an average thickness of 7/64 of an inch (2.77 mm.), an average diameter of 7/32 of an inch (5.55 mm.), and an average hole diameter of 1/8 of an inch (3.17 mm.).

There is no apparent stage or period difference in the stone objects used for personal adornment. All of the forms described are found throughout the Developmental Pueblo period and at the beginning of the Great Pueblo horizon. There is no evidence relative to the Modified Basket Maker in this locality. The only feature that might be considered of some significance is a seeming increase in the amount of turquoise toward the end of the Developmental stage. This tendency is so slight, however, that it may be more circumstantial than an actual indication of a trend. There were more burials representing the middle and late phases of the period than the early stage and, as most of the turquoise recovered was from graves, the indication of an increase may be owing to that factor rather than to a greater importation of that material.

Objects of Shell

Shells and shellwork did not constitute one of the more important traits in the cultural complex of the inhabitants of the Whitewater District. Compared with other types of materials and artifacts shell objects are in a decided minority, and consist solely of articles for personal adornment. Pendants, bracelets, and beads were made from the material. Rectangular-shaped pendants of abalone shell (pl. 48, *b*) are present or are represented by fragments in the collection. Abalone shell was known at an early stage in the Anasazi province and ornaments made from it occur in Basket Maker and Modified Basket Maker sites as well as in some of the Pueblo horizons. It is doubtful that the material was worked in the Whitewater District as no scraps of it appeared in any of the debris, only completed, or portions of finished, articles. The actual pendants were probably traded into the district from centers farther west. Glycymeris shells from the Gulf of California furnished material for pendants, bracelets, and beads. A characteristic triangular pendant made from that kind of shell is illustrated by *a*, plate 48. There were more of this type in the Whitewater than all others combined. The incised lines with a contrasting filler, black on some and red on others, is typical of the form. Similar examples are found in sites farther west and south and the type is considered by some as a development of and diffusion from the Hohokam province in the Gila Valley. Whether the present specimens came directly into the Whitewater from that area or were transmitted by peoples farther west who were in contact with the Hohokam is not known. They did not appear, however, until middle Developmental times in this region. Glycymeris shell bracelets and armlets were cut from the inner edge of the shell and generally have a slight protuberance at the point where the valve was located. Several of these circles can be obtained, with progressively decreasing diameters, from a single shell but as a rule only one was cut away, as is indicated by the natural surface on one edge of most such specimens. Once in a while an example will turn up with two cut edges, generally on the arm of an infant or young child, yet such occurrences are uncommon. The smaller forms were worn around the wrist or lower arm and the larger ones above the elbow on the upper arm. They rarely were worn in less than a pair and generally occur in sets of four. Sometimes a larger portion of the valve was left on the circle of shell and carved into an additional ornament. These take the form of frogs, shells, and animal forms. None of these were found in the Whitewater ruins, however. Beads made from this shell are of the flat, circular type. Broken bracelets and remnants of the shells from which bracelets were cut furnished the necessary material. Glycymeris and some kinds of clamshells must have been traded into the district and worked up by the local inhabitants because numerous scraps and small pieces of the material were observed scattered through the debris in some of the house pits and in the refuse mounds.

One simple form of bead consists of an olivella shell with one end removed. The suspension cord was passed through a perforation that is a natural feature of the shell. This type of bead is found all over the Southwest and there is no doubt that the shells were brought in as the result of trade. Beads of this type seem to have had their greatest vogue during the Basket Maker periods and in early Developmental Pueblo times, although they have been quite popular in the modern phase. Large numbers of them are found in Basket Maker graves. The mouth of the deceased was often filled with them before the body was interred and numerous strings were tossed into the pit before the corpse was covered over. In comparison to other localities, the Whitewater District did not possess many of this type. Most of those found had been strung in short strands and worn as bracelets. A few seem to have been mixed in necklaces with other kinds of beads, but for the most part their use was in bracelets. Unworked shells were apparently imported into the area as various uncut examples were found during the digging.

The most interesting lot of shell beads was that found in room 10 of the second unit in the Developmental village.[88] These, it will be recalled, were mostly of the simple disk type, although there were a few of the figure-8 shape with the perforation for suspension in the smaller segment. These beads are of pink, orange, red, and white shell that has not been identified. There was nothing to indicate how they were strung, if they were, because they were together in a group suggesting that they had been in a bag or pouch of perishable material. Possibly they were the product of the village beadmaker and had not been traded before they were dropped in the room and lost. One of the triangular-shaped pendants, like *a*, plate 48, was associated with these beads. The latter were somewhat irregular in thickness and diameter, but the variation was not great and when strung would average 20 beads to the inch. There were slightly more than 9,000 in the group. The figure-8 beads have generally been considered as being more characteristically a Great Pueblo type. Their presence in the second unit would tend to indicate a somewhat earlier horizon, and to date them in the latter half of the Developmental period. They were not common, however, and may represent the beginnings of the type. None of the fine disk forms occurred in the early part of the Developmental phase. The only shell beads attributable to that stage are those made from the olivella.

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[88] See Part I, p. 202.

HUMAN BURIALS

The burials in association with the house remains in the Whitewater District had several interesting features. From the evidence obtained during the course of the investigations it appears that inhumation was the chief method used in disposing of the dead. There were no indications of cremation and nothing suggested the possibility of exposure or other forms of treatment for the deceased. There is, however, the problem of the remains from the Great Pueblo ruins. As previously stated, there were no traces of extensive interments in the rubbish heaps associated with those structures and only a few graves that could be attributed to that horizon were found in the work around the large buildings. It is possible that there may be a number of burials in the ruins proper. Lack of excavation in that portion of the main site leaves the matter in doubt. In this connection, it will be recalled, attention was directed to the fact that absence of cemeteries or general burial grounds was common in the Great Pueblo period for centers dominated by the Chaco cultural pattern. Because of the strong Chaco influence in the Whitewater District similar practices in the disposal of the dead, methods as yet unknown, probably prevailed, which would explain the paucity of remains from the Great period.

Most of the Whitewater interments were in the refuse mounds associated with the various house groups. A few were in some of the rooms in dwellings, some were in shallow pits scraped out of the natural earth, often beneath a rubbish heap that was placed there subsequently, and others were in the pit portions of granaries or under their floors. There was only one example of a slab-lined pit or stone-box grave specially prepared for the purpose. A majority of the remains were merely covered with earth, but there was a small group that had received somewhat better treatment in that respect. Included in this series are those which had large, flat slabs of stone placed over the grave before the dirt was thrown on, some that were beneath layers of small stones, and a few that had the top of the pit covered with small poles, twigs and grass and sealed with a coating of mud plaster. Some of the graves with slab lids also gave indications that the large stones had been supported by small poles that had been laid across the opening before the cover was set in position. This is the so-called Mesa Verde type of burial, although it is questionable that the form diffused from that center because it has been found in sites where there is no evidence of Mesa Verde influence. There does not appear to be any correlation between the use of slabs, small stones, and poles and plaster and the various phases represented by the mortuary offerings. Chaco, Little Colorado, and Kana-a types of pottery occur in association with the different forms and in some cases there were no accompanying objects. In general, however, the use of special coverings in addition to the earth was more pronounced in the middle and late phases of the Developmental Pueblo than in its beginning stage. Mention of the custom of burying portions of a body and the placing of infants and small children near fire pits was made in connection with the discussion of finding such features in and near some of the houses[89] and further consideration is not essential here.

The 150 burials have a number of features that may be grouped under various categories. The matter of position, where enough of the skeleton remained to make determination possible, is one of these. The direction of the head was: East, 12; north, 6; west, 11; south, 6; northwest, 11; northeast, 46; southeast, 4; southwest, 15. This shows that there was a preference for a northerly placement, with the northeast predominant. A majority of those with the northern orientation were burials accompanied by late Developmental Pueblo pottery types, an indication that it was more or less characteristic of that phase. During the earlier stages the question of head direction does not seem to have had any significance. In 36 cases the bones had been disturbed or were too disintegrated to be certain of the head direction, and in 3 the bodies were in a sitting position with the heads up. Those buried in the sitting posture had the knees drawn up under the chin and the arms wrapped around and crossed in front of the legs. Other body positions show that 28 were placed on the right side, 31 on the left side, 38 on the back, and 7 face downward. In all but 2 examples the legs were either partially or wholly flexed. There were no examples of the extended or full length interments. The two examples apparently were the remains of captives or persons in disrepute about the community because they gave indications of having been dumped unceremoniously into a hole and covered over. One was lying face down, the left leg extended and the right slightly flexed across it, the arms extended over the back and the wrists crossed as though tied in that position. The other had been crowded into a pit that was too small and one leg and one arm projected beyond its borders, the remainder of the body being considerably distorted. There does not appear to have been any particular position for the arms and hands. In some cases they were folded across the chest, in others one is extended along the body and the other is bent and across the chest. Others had the hands folded at the lap or pelvis, and in a few cases the arms were bent, the hands placed with palms together under the head. There is no correlation between head direction and the body position.

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[89] Part I, pp. 185–186, pp. 205–206.

Mortuary offerings were present in 127 of the graves. These consisted of pottery, bone and stone implements, and stone and shell beads. A few of the skeletons had beads on the neck or wrist, but no additional artifacts. Where this was the case the objects were not counted as offerings as they doubtless had been worn in life and were left on the body when it was interred. Only things giving definite suggestion of having been placed in the grave are counted as offerings. The preferred position for the articles was at the head. This was the case in 56 examples. The objects were at the head and by the shoulder in 5 graves, at the head and beside the body in 6, at the head and near the legs in 2. An example of the head and body placement in an infant's grave is illustrated by *a*, plate 51. Objects were placed at the shoulder in 6, alongside the body in 18 (pl. 51, *b*), on top of the body in 10, by the body and feet in 2, and by the feet alone in 2 of the graves. Many of the infant burials were too disintegrated to tell where the objects were placed in relation to the body and the same was true for several adults, hence the 20 graves with articles whose location can not be indicated. The remaining 23 interments definitely had no offerings.

There were several graves containing accompanying offerings other than the usual artifacts. The bodies of 2 infants had, in addition to pottery vessels, turkey skeletons in association with them. Careful examination of the assemblage in each case showed that the fowls had unquestionably been placed there at the same time as the human remains and that the association was intentional and not fortuitous. Another child burial had a dog on one side and a turkey on the other. A small bowl and pitcher rested at the head of the youngster, a bowl by the head of the turkey, and a shallow dish made from the side of a broken jar was placed by the dog's head. Here again the burials were contemporary and intentionally together. Dogs accompanied the remains of adults in two burials. In both of those examples the funerary furniture was at the head and the dog remains were lying close to the legs and feet. The animals had been placed there at the same time as the human bodies. The real reason for the placing of dogs and turkeys in graves with people is, of course, not known. Yet it is possible that beliefs similar to those held by later Indians were in vogue at that time and that a person's pet was killed and buried at the same time in order that their spirits might continue to be together in the after world. Or it may be that some of the inhabitants of the Whitewater District had somewhat similar conceptions to those of the Aztecs regarding the after world and felt that it was necessary to have the soul of a dog to guide the soul of a man on the journey. Turkeys do not seem to have served in that capacity as a rule yet might have been regarded in that light in this locality. There were numerous turkey and dog burials, as mentioned in Part I, in addition to those associated with human remains.

There were a number of reburials, skeletons that had been disturbed in digging new graves or in making excavations for some other purpose. Most of these were from the early stage of occupancy as shown by the accompanying pieces of pottery. One of the Modified Basket Maker vessels (pl. 20, *a*) came from such an interment. Burials of this type are characterized by a mixing of the bones, a certain amount of breakage, and some missing members. The penetration of older graves was undoubtedly accidental and not for the purpose of looting as in all those uncovered the mortuary offerings had been incorporated in the new interment. Three graves contained more than one person. One had an adult, presumably an aged female, and two children. Another contained two children, and the third had an adult, probably a young female, and a child. A number of examples of superimposed graves were found in the refuse mounds accompanying the second and third unit structures. In several cases these had stratigraphic significance from the standpoint of the sequence of types of artifacts and the information thus obtained checked with that from the tests made in the mounds and from the pillars in the house pits.

Out of the 150 individuals represented by the remains 69 were adults, 76 were children or infants, and 5 of the burials were too disintegrated to judge their status. In the adult series 23 were male, 28 were female, and 18 were unidentified as to sex. Some of the skeletons were too fragmentary for sexing and others were not sufficiently pronounced in their characteristics for identification in the field. Unfortunately much of the material was in such condition that it was not possible to send it to the laboratory for more complete and thorough investigation. Out of the 150 graves only 19 skeletons were suitable for anatomical studies. A number of the infant skeletons were in good state of preservation but they are not adapted to comparative purposes and, as is customary, the skulls fell apart at the sutures when removed from the ground.

The cause of death is not determinable in most cases, but a few individuals gave evidence of having met a violent end. A number of the skulls had small, circular broken areas that apparently were produced by means of a comparatively sharp-pointed instrument. Others had larger more irregular places where the bone was crushed in but not punched out, wounds undoubtedly produced by a blunt object such as a maul or club. Some of these had started to heal, indicating that the person had lingered on for a time before succumbing. There were a few examples where the bones indicated that the individual had recovered from similar wounds. Projectile points were associated with skeletons in several instances in positions suggesting they had been in the body of the person when it was interred. Several were found in the chest cavities and one was between the shoulder blade and the ribs, the inner surface of the scapula showing a scar such as might be produced by a point. There were no examples, however, of points actually embedded in bones. Suggestion that the points were the cause of death is by inference rather than from indisputable evidence. Where points occurred as mortuary offerings they were either placed by the head or in one of the accompanying vessels.

Various individuals showed the effects of broken bones that had healed and many had lost a number of teeth. Dental caries were quite common and it is probable that drastic means were resorted to on occasion to remove aching teeth. One adult was found with all of the teeth missing and indications were that this had taken place a number of years before death. Several had additional teeth protruding from other than the customary places. One of the best examples of this condition is in the skull illustrated in plate 52 in the section on the skeletal remains. There were not many traces of pathological conditions and none indicating any pronounced changes in the bones. In general it may be said that the people in the Whitewater District exhibited about the same characteristics as other culturally related groups in New Mexico and Arizona.

SUMMARY AND DISCUSSION

The artifacts from the Whitewater District consist in the main of objects made from durable materials. Articles fashioned from perishable substances are entirely missing and as a consequence the picture of the material culture as presented by the surviving items is decidedly one sided. There is nothing to indicate the type of clothing, footgear, textiles or styles of basketry. The objects available for study are pottery vessels, additional objects of fired clay, bone and stone implements, and ornaments of stone and shell.

Stratigraphic tests show a definite progression in pottery forms and a certain sequence in the appearance of types. This is augmented by the association between ceramic styles and house remains and an indication of a certain time factor through the dendrochronological dating of some of the structures. The earliest type of pottery noted for the district is a form identifiable as late Modified Basket Maker of the eastern variety, one that is sometimes called La Plata black on white. This is the type occurring across the plateau in western New Mexico to the San Juan and on into the northeastern San Juan Basin. The second type of pottery in the series is one that is typical of the beginning stage of the Developmental Pueblo period throughout the portion of the Anasazi province that was characterized by the Chaco cultural pattern. This type is known as Chaco I or Kiatuthlanna black on white. Subsequently a new form appeared that gives evidence of a strong Chaco influence, but which seemingly stems from the area lying between the Puerco and Little Colorado Rivers. The vessels in this group have been called the Little Colorado style of early Developmental Pueblo. The ware proper indicates an affinity with types found along the Little Colorado while the designs suggest a Chaco derivation. This type of pottery was closely followed by a third early Developmental Pueblo form that is called Kana-a black on white. The latter centered about the Kayenta district in northeastern Arizona and apparently did not diffuse as rapidly as the other forms. Most of the ceramic developments during middle and late phases of the Whitewater occupation were an outgrowth from these three forms with some additional introductions from other Little Colorado centers, from the Tularosa or Upper Gila region in central western New Mexico, and continued influence from the Chaco Canyon area in northwestern New Mexico. Changes in the painted wares were accompanied by modifications in the culinary vessels in which there was a definite progression from smoothed exterior surfaces to banded necks with smooth bodies, smooth-bodied vessels with manipulated-neck coils, vessels with allover indented corrugation of a coarse variety to those with narrow coils and fine indentations. The banded-neck style seems to have penetrated the region in association with the Chaco I style of the painted vessels because sites with the Little Colorado and Kana-a black on white a short distance west from the Whitewater have smoothed-surface culinary wares rather than banded-neck forms. The black-interior vessels show an interesting progression along two lines. The earliest forms, found in association with the Chaco I wares, have a dull black interior and a gray exterior. One group developed lighter and lighter-colored exteriors until a black interior and white exterior resulted. The other went from gray to gray brown to brown red to red with black interior. The latter form was widespread in its distribution along the southern borders of the Pueblo area and probably originated in the south. The red wares with painted decoration in black played a very minor part in the district. Such as are present were probably introduced and were not of local manufacture.

The significant feature about the pottery evidence is that it demonstrates an early southwest extension of influence from the Chaco Canyon area with a subsequent spread toward the northwest from Little Colorado centers and toward the southeast from the Kayenta or Tusayan region. The movement was contrary to that postulated by many southwestern workers and tends to show that traits appearing in the Chaco that have been attributed to influence penetrating from the Little Colorado region actually belong in the Chaco and diffused from there toward the Little Colorado. A number of similarities that occur between the so-called Puerco black on white and some of the Chaco Canyon wares probably resulted from Chaco influence on the Little Colorado series rather than the reverse. The small part played by the Kayenta or Tusayan wares in early developments in the Whitewater District and along the Puerco River is enlightening as it generally has been supposed that they contributed considerable impetus to the growth in those sections. On the basis of the Whitewater evidence it seems they actually had little effect on general trends. The problem of the Little Colorado and its relation to cultural growth in districts farther east is not helped particularly by the material from the Whitewater. On the basis of indications in this district it would seem that much that appears in the Tularosa region and that has been attributed to an eastward spread from the Little Colorado probably owes its stimulus to some other source. The similarities between Puerco black on white and the so-called Reserve black on white in the Tularosa series appear more likely to be the result of developments out of a widespread Chaco influence than to an eastward diffusion of the Puerco style. This is augmented by the definite time lag demonstrated by the dendrochronological dates for the Whitewater[90] and the fact that forms from farther west that presumably adumbrated eastern types had not appeared in the Whitewater at a time when the latter were known in the east. From indications in the present material it would seem that there must have been a strong interplay of influences between the Chaco and Tularosa regions before the growth of that between the Tularosa and Little Colorado.

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[90] Part I, pp. 262–263.

Throughout the entire period represented by the material from the Whitewater District the Chaco cultural pattern predominated. In the early stages the tendency to a peripheral lag was pronounced, but as the Developmental Pueblo period progressed diffusion was more rapid and toward the end of the stage ceramic styles appeared in a more rapid succession than they did in the main Chaco centers. By the beginning of the Great Pueblo period the lag was a small one and there may well have been considerable travel back and forth along the Puerco from the outlying precincts to the main centers of the Chaco group.

Dated timbers from the different structures indicate that the Chaco I type of vessels appeared in the early part of the ninth century. The Little Colorado early Developmental Pueblo series dates from about the middle of the century and the Kana-a came in shortly afterward. The Chaco-Transitional or Red Mesa black on white appeared late in the ninth and early in the tenth centuries. The Escavada black on white in the Chaco series dates from shortly after the beginning of the tenth century. The various hachured wares of the Chaco series and the vessels with the heavy, solid type of decoration appeared in the latter part of the tenth century. The few Tularosa examples date from the beginning of the eleventh century. The developed phase of the Little Colorado series belongs to the latter half of the tenth century. The banded-neck culinary wares date from the early part of the ninth century. The form with manipulated neck coils appeared toward the end of the century and continued to about the middle of the tenth when the allover coarse style of indented-corrugated appeared. The narrow coil with fine indentations was introduced late in the tenth century.

The stone and bone tools did not show much in the way of change and progression. The types are similar to those found in sites of comparable culture and have the same slight variations from phase to phase. There is some indication of southern influence in the presence of stone pipes and certain of the stone and shell ornaments. Shell, however, was a relatively unimportant trait in the general complex.

The skeletal material is not sufficient to give a broad view of the general characteristics of the people, but a few interesting suggestions have come from a study of some of the remains. Dr. Stewart (Appendix B) adds to the growing mass of evidence tending to show that there was no great change in physical type during the transition between the Basket Makers and the Pueblos, a fact contrary to prevailing opinion that the beginning of the Pueblo periods was marked by an infiltration of round-headed groups. He points out that the apparent head differences are due to an intentional deformation rather than to inherent characteristics. The present group shows definite relationship to the Basket Maker physical type as well as to other peoples having the Anasazi cultural pattern, the so-called "Southwest Plateau" physical type. The main difference between the two lies in the broader palates of the Whitewater skulls. According to Dr. Stewart the "lambdoid" type of deformation present on the Whitewater specimens indicates a definite relationship with peoples who occupied certain sites in the Chaco Canyon and southwestern Colorado, a feature which correlates nicely with the cultural evidence for a predominant Chaco influence in the arts and industries. In brief it may be said that the Whitewater occupants culturally and physically were typical of the Anasazi province and represent one variant of the pattern stemming from the Chaco Canyon area.

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APPENDIX A

MEASUREMENTS AND FINDING PLACES OF OBJECTS SHOWN IN ILLUSTRATIONS

TABLE 1.—*Size and finding places of objects illustrated in plates*

Plate	Height		Diameter		Place found	Field No.	Museum No.[1]
	Inches	Centimeters	Inches	Centimeters			
2, *a*	4 5/32	10.52	5 11/32	13.55	Floor structure 15	56-32	US-367732.
b	6 3/8	16.19	7 1/8	18.09	Burial 16	96	US-367385.
c	3 27/32	9.79	4 3/8	11.11	Burial 56	40-32	US-367441.
d	2 9/16	6.52	4 3/16	10.63	Burial 53	3-32	US-367436.
e	7 3/4	19.69	6 3/4	17.14	SW. shelter structure 15	29-32	US-367718.
f	7 5/32	18.02	7 7/32	18.33	SW. shelter structure 15	30-32	US-367719.
3, *a*	5 1/16	12.85	5 5/16	13.49	Burial 17	98	US-367386.
b	4 7/8	12.38	4 15/16	12.54	Burial 4	13	US-367362.
4, *a*	7 11/16	19.52	6 9/16	16.66	Burial 3	11	US-367358.
b	6 1/16	15.39	5 11/16	14.44	Burial 7	17	Grubbs collection.
5, *a*	3 7/8	9.84	4 1/4	10.79	Burial 6-33	39	LA:30-363.
b	4	10.16	4 1/8	10.47	Burial 7-33	43	LA:30-362.
c	7	17.78	6 1/8	15.55	Burial 2-33	159	LA:30-361.
d	5 3/4	14.60	5 5/8	14.28	Burial 5-33	166	LA:30-331.
e	5 7/8	14.92	4 7/8	12.38	Burial 3-33	163	LA:30-360.
6, *a*	4	10.16	4 9/16	11.58	Burial 24	132	US-367397.
b	4 9/16	11.56	4 7/16	11.27	Burial 121	274-32	US-367571.
7, *a*	4 11/16	11.90	4	10.16	Burial 37	164	Grubbs collection.
b	4 1/4	10.79	5 5/16	13.49	Burial 8	22	Grubbs collection.
7, *c*	5 21/32	14.42	6	15.24	Burial 97	209-32	US-367529.
d	6 13/16	17.30	5 31/32	15.16	Burial 61	97-32	US-367450.
e	5 19/32	14.16	4 29/32	12.52	Burial 103	226-32	Grubbs collection.
f	5 9/32	13.36	4 5/8	11.75	Burial 65	108-32	US-367461.
8, *a*	1 3/16	3.01	5 1/8	13.01	Burial 23	130	US-367396.
d							
b	1 5/8	4.12	5 11/16	14.44	Burial 34-A	158	US-367420.
c							
9, *a*	2 1/32	5.15	1 3/32 3 3/16	2.75 8.09	Refuse 32 C	164-32	US-367766.
b	2 3/4	6.98	1 5/8 3 1/4	4.12 8.25	Burial 111	255-32	US-367556.
c	5 1/2	13.97	3 3/4	9.52	Structure 8	79	US-367614.
d	3 3/4	9.52	3	7.62	Floor, structure 15	57-32	US-367733.
e	3 3/8	8.57	3 1/16	7.77	Burial 53	4-32	US-367437.
f	3 23/32	9.45	3 7/16 3 1/4	8.73 8.25	Burial 26	138	US-367402.
10, *a*	4 1/2	11.43	3 3/4	9.52	Burial 12-33	53	LA:30-320.
b	4 3/8	11.11	3	7.62	Burial 3-33	15	LA:30-368.
c	7 3/4	19.68	5 1/2	13.97	Burial 14-33	82	LA:30-321.
d	4 3/8	11.11	3 1/4	8.25	Burial 13-33	59	LA:30-352.
e	5 7/8	14.92	4 3/4	12.06	Burial A-2-33	125	LA:30-357.
11, *a*	5 5/8	14.28	4 3/4	12.06	Burial 16-33	86	LA:30-355.
b	5 7/8	14.92	4 7/8	12.38	Burial A-1-33	91	LA:30-353.
c	4 3/8	11.11	4 1/16	10.31	Burial 7-33	172	LA:30-351.
d	3 7/8	9.84	3 5/8	9.20	Burial 12-33	54	LA:30-349.
e	5 5/8	14.28	4 3/4	12.06	Burial A-2-33	153	LA:30-356.
f	5 7/8	14.92	5 3/4	14.60	Burial 5-33	17	LA:30-327.
12, *a*	3 1/2	8.89	2 1/2	6.35	Refuse A	31	US-367637.
b	4 3/16	10.63	3 3/4	9.52	Burial 10	26A	US-367373.
c	5 9/16	14.12	5 3/16	13.17	Burial 18	100	US-367388.
d	4 5/16	10.95	3 1/4	8.25	Burial 11	28	US-367375.
e	5 1/4	13.33	4 5/16	10.95	Burial 28	144	Grubbs collection.
f	4 3/4	12.06	3 7/8	9.84	Refuse G	202	US-367667.
13, *a*	6 3/8	16.19	5 3/8	13.65	Refuse B-33	178	LA:30-323.
b	5 15/16	15.08	5 3/8	13.65	Burial 19-33	138	LA:30-354.
c	7 11/16	19.52	5 19/32	14.15	Burial 101	215-32	US-367532.
d	6 7/8	17.45	4 7/8	12.38	Burial 103	227-32	Grubbs collection.
14, *a*	2 15/32	6.27	2 2 1/2	5.08 6.35	Burial 83	168-32	Grubbs collection.
b	2 1/4	5.71	1 15/16	4.92	Burial 36	163	US-367425.

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[1] "US" indicates U. S. National Museum catalog number. "LA" is Laboratory of Anthropology.

TABLE 1.—*Size and finding places of objects illustrated in plates*—Continued

Plate	Height		Diameter		Place found	Field No.	Museum No.
	Inches	Centimeters	Inches	Centimeters			
14, *c*	2 15/16	7.46	2¼ 3	5.71 7.62	Burial 119	269-32	US-367566.
d	1 15/16	4.92	1⅝ 2⅛	4.12 5.39	Burial 2	7	US-367356.
e	4⅝	11.76	4 31/32 5 25/32	12.62 14.72	Burial 117	266-32	Grubbs collection.
f	4 5/16	10.98	2 9/16 5⅛	6.50 13.01	Burial 74	136-32	US-367484.
g	3⅞	9.84	3 13/16	9.68	Burial 25	137	US-367401.
h	2 7/16	6.19	2¾	6.98	Burial 110	251-32G	US-367552.
15, *a*	8 23/32	22.09	7½ 10 5/16	19.05 26.19	Burial 62	100-32	US-367454.
b	7 5/32	18.22	6	15.24	Burial 99	214-32	US-367531.
c	7¼	18.41	5 23/32	14.51	Burial 125	284-32	US-367580.
d	6 7/32	15.76	4 21/32	11.72	Burial 104	228-32	Grubbs collection.
e	8 21/32	22.02	8 11/32	21.18	Burial 59	90-32	US-367444.
16, *a*	6¾	17.14	5⅜	13.65	Burial 33	151	Grubbs collection.
b	4 9/32	10.86	4 5/32	10.55	Burial 102	223-32	US-367540.
c	6⅜	16.19	5	12.70	Burial 40	195	US-367431.
d	9¼	23.49	*Neck*		Burial 8	21	US-367368.
			3 15/16	10.00			
			Base				
			5 5/16	13.49			
e	8½	21.59	6⅜	16.19	Burial 25	136	US-367400.
f	7⅝	19.36	6⅜	16.19	Burial 43	200	Grubbs collection.
17, *a*	5⅝	14.28	5⅜	13.65	Burial 31	148	Grubbs collection.
b	5¾	14.60	5 11/16	14.44	Burial 7	19	US-367366.
c	4 13/32	11.21	5 5/32	13.06	Burial 92	189-32	US-367517.
d	4 5/32	10.57	4 13/32	11.19	Burial 123	278-32	Grubbs collection.
e	2⅝	6.66	3¾	9.52	Burial 23	127	Grubbs collection.
f	3 13/16	9.68	4⅛	10.47	Burial 34	155	US-367418.
18, *a*	1⅝	4.12	Diameter of bowl		Burial 31	149	US-367410.
			3 5/16	8.41			
			Length of bowl				
			4⅞	12.38			
b	1⅞	4.76	Diameter of bowl		Refuse A	32	US-367638.
			3¾	9.52			
			Length of bowl				
			4⅞	12.38			
c	1¾	4.44	Diameter of bowl		Burial 7	20	US-367367.
			3¾	9.52			
			Length of bowl				
			6⅞	17.46			

TABLE 1.—*Size and finding places of objects illustrated in plates*—Continued

Plate	Height		Diameter of bowl		Place found	Field No.	Museum No.
	Inches	Centimeters	Inches	Centimeters			
19, *a*	15/16	2.38	2	5.08	Burial 15	94	US-367384.
			Length of bowl				
			4 1/16	10.31			
			Diameter of bowl				
b	1 7/16	3.65	2 7/8	7.30	Refuse south structure 8	80	Grubbs collection.
			Length of bowl				
			6 1/16	15.39			
			Diameter of bowl				
c	1 7/16	3.65	3 1/4	8.25	Ventilator of structure 10	86	Grubbs collection.
			Length of bowl				
			6 1/4	15.87			
			Diameter				
20, *a*	4 1/16	10.31	6 3/16	15.71	Burial 30	146	US-367409.
b	6	15.24	10 1/16	25.55	Burial 6	15	US-367363.
21, *a*	2 9/16	6.50	5 3/8	13.65	Burial 2	6	US-367355.
b	3 1/8	7.93	6 15/16 8	17.62 20.32	Ventilator of structure 10	85	US-367622.
c	3 5/16	8.41	8 3/16 8 13/16	20.79 22.38	Burial 25	135	US-367399.
	Width		Length				
22, *a* *b*	5 9/32	13.41	2 23/32	6.91	Refuse, unit No. 3	299-32	US-367801.
	Height		Diameter				
c	4 17/32	11.51	8 31/32	22.75	Burial 61	98-32	US-367451.
23, *a*	2 3/8	6.03	5 1/4	13.33	Burial 14	90	US-367381.
b	2	5.08	5	12.70	Burial 35	159	US-367421.
c	2 1/4	5.71	5 7/16	13.81	Burial 42	197	US-367433.
d	3 1/16	7.77	6 1/16	15.39	Burial 15	92	US-367382.
e	2 11/16	6.82	6 3/16	15.71	Burial 22	125	US-367393.
f	2 1/2	6.35	5 13/16	14.76	Burial 26	139	US-367403.
24, *a*	3 1/16	7.77	8 1/4	20.95	Burial 11	29	US-367376.
b	3 1/8	7.93	6 15/16 8	17.62 20.32	Ventilator of structure 10	85	US-367622.
c	3 1/2	8.89	8 3/8	21.27	Burial 38	168	US-367429.
d	3 9/16	9.04	8 1/2	21.59	Burial 20	103	Grubbs collection.
e	3 7/16	8.73	8 11/16	22.06	Burial 7	17	US-367365.
f	3 9/16	9.04	8 3/8	21.27	Refuse A	33	US-367639.
25, *a*	--------	--------	5 3/4	14.60	Burial A-4-33	130	LA:30-296.
b	--------	--------	5 3/8	13.65	Burial 19-33	139	LA:30-299.
c	--------	--------	7 1/2	19.05	Structure 17	147	LA:30-340.
d	--------	--------	7 1/8 7 3/8	18.09 18.73	Burial 16-33	88	LA:30-301.
e	--------	--------	6 3/4 7 3/8	17.14 18.73	Burial 8-33	47	LA:30-337.

TABLE 1.—*Size and finding places of objects illustrated in plates*—Continued

Plate	Height		Diameter		Place found	Field No.	Museum No.
	Inches	Centimeters	Inches	Centimeters			
25, *f*	--------	--------	6 6 3/16	15.24 15.71	Burial 11-33	52	LA:30-311.
26, *a*	--------	--------	5⅞	14.92	Burial 1-33	2	LA:30-297.
b	--------	--------	5 7/16	13.81	Burial A-1-33	93	LA:30-336.
c	--------	--------	6⅞	17.46	Burial 1-33	3	LA:30-307.
d	--------	--------	8¾	22.22	Burial 6-33	41	LA:30-303.
e	--------	--------	6⅝	16.82	Burial 13-33	60	LA:30-308.
f	--------	--------	6	15.24	Burial 8-33	48	LA:30-309.
27, *a*	--------	--------	5¼ 5⅜	13.33 13.65	Burial 7-33	170	LA:30-314.
b	--------	--------	7¼ 8	18.41 20.32	Burial A-2-33	126	LA:30-310.
c	--------	--------	8 7/16	21.43	Burial A-2-33	152	LA:30-305.
d	--------	--------	6¾ 7¾	17.14 19.68	Refuse B-33	177	LA:30-298.
e	--------	--------	8⅜ 7⅝	21.27 19.36	Burial 6-33	167	LA:30-334.
f	--------	--------	5⅝ 6⅝	14.28 16.82	Refuse B-33	175	LA:30-304.
28, *a*	2 9/16	6.50	5⅜	13.65	Burial 2	6	US-367355.
b	2¼	5.71	5⅜	13.65	Burial 40	196	Grubbs collection.
c	3⅜	8.57	6 1/16	15.39	Burial 8	23	US-367369.
d	3½	8.89	7½	19.05	Burial 21	112	Grubbs collection.
e	3 5/16	8.41	8 3/16 8 13/16	20.79 22.38	Burial 25	135	US-367399.
f	3⅝	9.20	7⅛	18.09	Burial 17	97	Grubbs collection.
29, *a*	5⅛	13.01	11 1/16	28.09	Burial 2	5	US-367354.
b	2 29/32	7.35	6 3/16 6 5/16	15.71 16.03	Burial 112	256-32	US-367557.
c	3 15/32	8.81	9¼ 9 9/16	23.49 24.28	Burial 69	119-32	US-367471.
d	3 11/16	9.36	8¼ 8 21/32	20.97 21.97	Burial 97	208-32	US-367528.
e	3 27/32	9.75	8¼ 8 17/32	20.96 21.65	Burial 101	216-32	US-367533.
f	4	10.16	8⅛ 9 1/16	20.63 23.01	Burial 24	134	Grubbs collection.
g	2 9/16	6.52	4 31/32 5 7/16	12.62 13.83	Burial 102	222-32	US-367539.
h	3 9/32	8.38	7 5/16	18.57	Burial 88	175-32	Grubbs collection.
i	3⅞	9.84	8 9/16	21.74	Burial 24	133	US-367398.
j	2 9/16	6.52	5¼ 5 11/32	13.32 13.58	Burial 102	220-32	US-367537.
k	4 13/16	12.22	9⅝	24.44	Burial 1	1	Grubbs collection.
l	2 1/32	5.18	5 11/32 5 7/16	13.58 13.82	Refuse 32 A	89-32	US-367758.
	Length		Width				
30, *a*	3⅞	9.84	3	7.62	Structure 7	72	US-367608.
b	3⅛	7.93	2⅛	5.39	Refuse A	35B	US-367641.
c	3 1/16	7.77	2¾	6.98	Structure 5b	67	US-367606.
d	3¼	8.25	2½	6.35	Refuse A	35A	US-367641.
31, *a*	1¾	4.44	1 5/16	3.33	Structure 10	89	US-367624.
b	1¼	3.17	⅞	2.22	Refuse A	44	US-367650.
c	2	5.08	1⅝	4.12	Refuse C	218	US-367663.
d	2½	6.35	2	5.08	Refuse A	42A	US-367648.
e	1 15/16	4.92	1⅞	4.76	Refuse east of Great Pueblo	178B	US-367685.
f	2	5.08	1 13/16	4.60	Burial 37	166	US-367427.
g	2 9/16	6.50	2½	6.35	Refuse C	210A	US-367658.
	Height		Diameter				
32, *a*	2 3/32	5.33	31/64 ⅞	1.2 2.2	Refuse 32 A	85-32	US-367755.
b	2 1/16	5.25	3/64 11/32	.11 .87	Structure 18	303-32	US-367804.
c	2	5.08	29/32 1¼	2.30 3.17	On bench in structure 15	47-32	US-367722.
d	1⅝	4.12	1½	3.81	Structure 12	121	US-367625.
e	2⅛	5.39	1 11/16	4.28	Structure 13b	186A	US-367634.
f	3½	8.89	1¼	3.17	Structure 13b	186B	US-367634.

TABLE 1.—*Size and finding places of objects illustrated in plates*—Continued

Plate	Length		Width		Place found	Field No.	Museum No.
	Inches	Centimeters	Inches	Centimeters			
33, *a*	3⅝	9.20	¼	0.63	Refuse east of Great Pueblo	119F	US-367680.
b	2⁷⁄₁₆	6.19	¼	.63	Structure 9	84H	US-367621.
c	2¾	6.98	¼	.63	Refuse east of Great Pueblo	119I	US-367680.
d	3⅛	7.93	¼	.63	Refuse east of Great Pueblo	119H	US-367680.
e	2¼	5.71	⁵⁄₁₆	.79	Refuse east of Great Pueblo	184F	US-367688.
f	4⅝	11.74	¾	1.90	Structure 7	76B	US-367612.
g	4⅜	11.11	⅜	.95	Refuse east of Great Pueblo	119C	US-367680.
h	3³⁄₁₆	8.09	⁷⁄₁₆	1.11	Refuse G	204B	US-367669.
34, *a*	5¹³⁄₁₆	14.76	⅝	1.58	Structure 7	76A	US-367612.
b	4	10.16	⁹⁄₁₆	1.42	Structure 1	52A	US-367586.
c	3⁵⁄₁₆	8.41	⁹⁄₁₆	1.42	Refuse A	37D	US-367643.
d	3	7.62	1¹⁄₁₆	1.74	Refuse A	37E	US-367643.
e	3¹¹⁄₁₆	9.36	½	1.27	Structure 3	64B	US-367600.
f	4¹⁄₁₆	10.31	½	1.27	Structure 9	84A	US-367621.
g	4	10.16	½	1.27	Structure 1	52B	US-367586.
h	4⅜	11.11	½	1.27	Structure 3	64A	US-367600.
35, *a*	4⅞	12.38	¾	1.90	Structure 7	76C	US-367612.
b	5⅜	13.65	⅝	1.58	Structure 9	84D	US-367621.
c	4¹¹⁄₁₆	11.90	⁷⁄₁₆	1.11	Refuse east of Great Pueblo	119B	US-367680.
d	3¹³⁄₁₆	9.68	¾	1.90	Refuse east of Great Pueblo	184D	US-367688.
e	4⁵⁄₁₆	10.95	⅝	1.58	Structure 2	55A	US-367591.
f	3¼	8.25	¹⁵⁄₃₂	1.19	Structure 1	52C	US-367586.
g	3⅝	9.20	⅝	1.58	Refuse east of Great Pueblo	184E	US-367688.
h	4⅜	11.11	¾	1.90	Structure 7	76D	US-367612.
36, *a*	3⁹⁄₁₆	9.04	⁷⁄₁₆	1.11	Lower floor, structure 2	57A	US-367593.
b	3¼	8.25	1¹⁄₁₆	1.74	Refuse east of Great Pueblo	182B	US-367686.
c	2¹⁵⁄₁₆	7.46	¼	.63	Lower floor, structure 2	57B	US-367593.
d	2⁵⁄₁₆	5.87	½	1.27	Burial 42	198A	US-367434.
e	3³⁄₁₆	8.09	¾	1.90	Refuse B	107A	US-367652.
f	3¹³⁄₁₆	9.68	⁷⁄₁₆	1.11	Refuse A	37A	US-367643.
g	3½	8.89	⁷⁄₁₆	1.11	Structure 9	84E	US-367621
h	3¼	8.25	⁷⁄₁₆	1.11	Refuse east of Great Pueblo	119G	US-367680.
i	2⅝	6.66	⁷⁄₁₆	1.11	Structure 9	84G	US-367621.
j	3¹³⁄₁₆	9.68	⅜	.95	Structure 3	64C	US-367600.
37, *a*	3⅜	8.57	⅛	.31	Structure 3	62	US-367598.
b	4⁹⁄₁₆	11.58	³⁄₁₆	.47	Structure 9	83C	US-367620.
c	4⅞	12.38	³⁄₁₆	.47	Refuse east of Great Pueblo	182A	US-367686.
d	3⅞	9.84	½	1.27	Burial 3	9	US-367359.
e	2½	6.35	⅝	1.58	Refuse C	211	US-367659.
f	1½	3.81	⁷⁄₁₆	1.11	Burial 4	12	US-367361.
g	⅞	2.22	⅜	.95	Structure 1	53B	US-367587.
h	¹³⁄₁₆	2.06	⁵⁄₁₆	.79	Structure 1	53A	US-367587.
i	¾	1.90	⁵⁄₁₆	.79	Structure 1	53C	US-367587.
38, *a*	3½	8.89	¾	1.90	Burial 3	10	US-367360.
b	3¹⁄₁₆	7.77	¾	1.90	Refuse C	220	US-367665.
c	5⁵⁄₁₆	13.49	¾	1.90	Structure 9	83A	US-367618.
d	3¹⁄₁₆	7.77	1¹⁄₁₆	2.69	Refuse east of Great Pueblo	183	US-367687.
e	3¹⁵⁄₁₆	10.00	1⅛	2.85	Refuse east of Great Pueblo	118	US-367679.
f	7³⁄₁₆	18.25	1¹³⁄₁₆	4.60	Structure 7	75	US-367611.

Plate	Total length		Groove length		Total width		Groove width		Thickness		Groove depth	
	Inches	Centimeters	Inches	Centimeters	Inches	Centimeters	Inches	Centimeters	Inches	Centimeters	Inches	Centimeters
39, *a*	21½	54.61	17	43.18	16½	41.91	11½	29.21	4	10.16	2	5.08
b	21½	54.61	14½	36.83	9½ 14	24.13 35.56	9½	24.13	4	10.16	2	5.08
c	22	55.88	13	33.02	9½ 16	24.13 40.64	8½	21.59	3	7.62	2	5.08

TABLE 1.—*Size and finding places of objects illustrated in plates*—Continued

Plate	Length		Width and thickness		Place found	Field No.	Museum No.
	Inches	Centimeters	Inches	Centimeters			
40, *a*	5¼	13.33	3¾ 2¼	9.52 5.71	Surface structure B	78A	US-367696.
b	5¹¹⁄₁₆	14.44	3¹¹⁄₁₆ 2⅝	9.36 6.66	Burial 6	16	US-367364.
c	4½	11.43	3½ 2⅞	8.89 7.30	Refuse E	193	US-367690.
d	5⅞	14.92	3⅝ 1¾	9.20 4.44	Refuse A	34	US-367640.
e	3⅞	9.84	3¹¹⁄₁₆ 2⅝	9.36 6.66	Surface structure B	78B	US-367696.
f	6⅝	16.82	3¼ 2¹⁄₁₆	8.25 5.23	Refuse B	106	US-367651.
41, *a*	3²¹⁄₃₂	9.28	3³⁄₃₂ 1¹³⁄₃₂	7.85 3.57	Refuse 32 F	241-32	US-367789.
b	5¹⁄₁₆	12.85	3³¹⁄₃₂ 2¹¹⁄₃₂	10.08 8.49	Granary D, structure 15	75-32	US-367745.
c	3²⁷⁄₃₂	9.75	3⁹⁄₁₆ 2⁹⁄₃₂	9.03 5.78	On bench in structure 15	50-B-32	US-367726.
d	3²⁵⁄₃₂	9.60	2¹¹⁄₁₆ 2²¹⁄₃₂	6.82 6.73	On bench in structure 15	50-C-32	US-367726.
e	8¹¹⁄₃₂	21.17	5¹¹⁄₁₆ 1¹³⁄₃₂	14.43 3.55	Between granaries and structure 16.	43-32	US-367747.
42, *a*	4⅞	12.38	3¾ 1⅛	9.52 2.85	On floor in structure 1	51	US-367585.
b	3¾	9.52	3¹⁄₁₆ 1¹¹⁄₁₆	7.77 4.28	Structure 3	58	US-367594.
c	5	12.70	4⅛ 3	10.47 7.62	Surface near 9-10-11 group	222	US-367699.
d	3¹¹⁄₁₆	9.36	2¾ 2¹⁄₁₆	6.98 5.23	Surface near 9-10-11 group	221	US-367699.
43, *a*	10¹⁷⁄₃₂	26.72	6²³⁄₃₄ 1³⁄₁₆	17.13 3.01	Burial 105	245-32	US-367544.
44, *a*	3⁵⁄₁₆	8.41	3¼ 2¹⁄₁₆	8.25 5.23	Unit No. 3	349-32A	US-367830.
b	4⁹⁄₃₂	10.85	3²³⁄₃₂ 1¹⁵⁄₃₂	9.45 3.68	Unit No. 3	349-32C	US-367830.
c	4¾	12.06	3²⁷⁄₃₂ 2½	9.78 6.35	Unit No. 3	349-32D	US-367830.
d	4⁹⁄₃₂	10.85	3¹¹⁄₃₂ 1¹¹⁄₁₆	8.51 4.28	Unit No. 3	349-32E	US-367830.
e	4¹³⁄₃₂	11.22	3²⁵⁄₃₂ 1⅝	9.60 4.12	Unit No. 3	349-32B	US-367830.
			Width across barbs				
45, *a*	2¹⁄₁₆	5.24	1	2.54	Refuse, unit No. 3	141-A-32	US-367761.
b	2⁵⁄₃₂	5.47	¾	1.90	Kiva, unit No. 3	331-32	US-367818.
c	1²⁹⁄₃₂	4.85	²³⁄₃₂	1.85	Structure 15 shelter	7-32	US-367703.
d	1²³⁄₃₂	4.36	²³⁄₃₂	1.85	Refuse, unit No. 3	233-32	US-367783.
e	1²³⁄₃₂	4.35	¹⁷⁄₃₂	1.35	Refuse 32 C	166-32	US-367768.
f	1¹³⁄₃₂	3.55	¾	1.90	Surface east of Great Pueblo	347-32	US-367700.
g	2¹⁄₃₂	5.15	²⁹⁄₃₂	2.25	Surface east of Great Pueblo	346-32	US-367700.
h	1²⁹⁄₃₂	4.84	1¹⁄₃₂	2.62	Near shelter of structure 15	26-32	US-367708.
i	2¹³⁄₃₂	6.11	²⁹⁄₃₂	2.25	Trench west of structure 1	1931A	US-367588.
46, *a*	1⁹⁄₁₆	3.96	¾	1.90	Refuse A	39A	US-367644.
b	1⅝	4.12	¹⁵⁄₁₆	2.38	Ventilator of structure 10	87	US-367623.
c	1¾	4.44	¾	1.90	Structure 3	61	US-367597.
d	2¼	5.71	⅞	2.22	Refuse G	205A	US-367670.
e	1⁹⁄₁₆	3.96	⁷⁄₁₆	1.11	Refuse C	217	US-367662.
f	1⅜	3.49	¹³⁄₁₆	2.06	Refuse A	43A	US-367649.
g	1⅜	3.50	⅝	1.58	Refuse east of Great Pueblo	176B	US-367684.
h	1⁷⁄₁₆	3.65	¹¹⁄₁₆	1.74	Refuse E	191	US-367692.
i	²⁹⁄₃₂	2.30	²³⁄₃₂	1.82	Refuse F	156	US-367666.
j	¾	1.90	½	1.27	Structure 5	69A	US-367604.
k	⁴⁵⁄₆₄	1.78	¹⁹⁄₃₂	1.50	Refuse C	214	US-367661.
l	⅞	2.22	³³⁄₆₄	1.30	Refuse C	213	US-367661.
m	1¹⁹⁄₃₂	4.05	⅝	1.58	Refuse B	109	US-367654.

TABLE 1.—*Size and finding places of objects illustrated in plates*—Continued

Plate	Height		Width and thickness		Place found	Field No.	Museum No.
	Inches	Centimeters	Inches	Centimeters			
47, *a*	15/16	2.38	3/4 5/8	1.90 1.58	Pit in mound east of structure 1.	120E	US-367694.
b	1 3/16	3.01	1 1/8 1/2	2.85 1.27	Refuse east of Great Pueblo	115A	US-367675.
c	1 1/4	3.17	1 7/32 13/16	3.08 2.06	Structure 5b	68	US-367603.
d	1 5/8	4.12	13/16 7/8	2.06 2.22	Refuse C	219	US-367664.
e	1 9/16	3.96	1 1/4 1 1/16	3.17 2.69	Refuse east of Great Pueblo	120A	US-367694.
f	1 1/16	2.69	1 1/16 13/16	2.69 2.06	Refuse east of Great Pueblo	120D	US-367694.
g	1 5/16	3.33	15/16 7/8	2.38 2.22	Refuse east of Great Pueblo	115B	US-367675.
h	1 7/16	3.65	1 1/4 1	3.17 2.54	Structure 3	60	US-367596.
i	1 1/4	3.17	1 1/8 1 1/16	2.85 2.69	Refuse east of Great Pueblo	120C	US-367694.
j	1 11/16	4.28	1 9/16 1 3/8	3.96 3.49	Refuse B	110A	US-367655.
k	1 5/8	4.12	1 1/4 1 3/16	3.17 3.01	Refuse east of Great Pueblo	175B	US-367683.
l	1 3/4	4.44	1 1/4 1 3/16	3.17 3.01	Refuse G	206	US-367671.
m	2 9/16	6.50	1 3/8 1 1/16	3.49 2.69	Refuse east of Great Pueblo	174A	US-367681.
n	2	5.08	1 5/16 1 1/8	3.33 2.85	Refuse east of Great Pueblo	174B	US-367681.
o	2 1/2	6.35	1 7/8 1 1/16	4.76 2.69	Structure 13b	171	US-367630.
	Length		Width				
48, *a*	1 3/16	3.01	5/16	0.79	Section G in structure 2 pillar	54A	US-367589.
b	1	2.54	11/16	1.74	Refuse A	40B	US-367646.
c	11/16	1.74	5/16	.79	Refuse B	110C	US-367657.
d	1 1/16	2.69	13/16	2.06	Refuse A	40A	US-367645.
			Width and thickness				
e	1 3/8	3.49	11/16 11/16	1.74 1.74	Refuse A	14	US-367635.
			Diameter bowl end				
f	1 7/8	4.76	53/64	2.10	Structure 7	73	US-367609.

Plate	Thickness		Diameter		Hole diameter		Place found	Field No.	Museum No.
	In.	Cm.	In.	Cm.	In.	Cm.			
49, *a*	3/64 to 9/64	0.11 1.42	9/64 to 15/64	0.35 .59	5/64 to 1/8	0.19 .31	Burial 33	153B	US-367417.
b	5/64 to 7/64	0.19 .27	11/64	.43	3/32	.23	Burial 33	152	US-367413.
c	1/16	.15	1/8	.31	1/16	.15	Burial 1	4A	US-367352.
50	5/64 to 9/64	.19 1.42	5/32 to 9/32	.39 .71	5/64 to 7/64	.19 .27	Burial 82	161-32	US-367501.

TABLE 2.—*Size and finding places of objects illustrated in text figures*

Figure	Height		Diameter		Place found	Field No.	Museum No.
	Inches	Centimeters	Inches	Centimeters			
7	17 7/8	45.40	14 3/8	36.51	SW. shelter structure 15	27-32	US-367716.
8	16	40.64	17	43.18	Kiva, unit No. 3	345-32	US-367834.
9	5 29/32	14.95	5 7/16	13.82	Burial 77	148-32	US-367488.
10	8 1/8	20.5	6 7/8	17.4	Burial 36	161	US-367423.
11	6 11/16	16.98	5 17/32	14.01	Burial 121	275-32	US-367572.
12	9 3/16	23.33	8 1/4	20.95	Burial 34-A	157	US-367419.
13	8 23/32	22.09	10 1/4	19.05	Burial 62	100-32	US-367454.
14	5 11/16	14.44	4 7/8	12.35	Burial 70	125-32	US-367475.
15 16	3 7/8	9.84	3 13/16 4 1/16	9.68 10.31	Burial 25	137	US-367401.
17	8 3/4	22.22	5 5/16 8 1/16	13.49 20.47	Burial 3	8	US-367357.
18	5 9/16	14.12	5 3/16	13.17	Burial 18	100	US-367388.
19	4 3/4	12.06	3 7/8	9.84	Refuse G	202	US-367667.
20	5 1/4	13.33	5	12.70	Burial 78	150-32	US-367490.
21	5 3/4	14.60	5 11/16	14.44	Burial 7	19	US-367366.
22	8 1/4	20.95	7 5/8	19.36	On floor of structure 15	61-32	US-367736.
23 24	7 1/32	17.83	7	17.78	Burial 80	155-32	US-367495.
25 26	4 17/32	11.46	4 5/32	10.56	Between N. and SW. shelters of structure 15.	36-32	US-367711.
27 28	4 7/16	11.21	5 5/32	13.06	Burial 92	189-32	US-367517.
29 30	4 5/32	10.57	4 7/16	11.27	Burial 123	278-32	Grubbs collection.
31	4	10.16	6 1/8	15.6	Burial 31	150	US-367411.
31	4	10.16	6 1/8	15.55	Burial 31	150	US-367411.
32	3 1/16	7.77	5 9/16	14.12	Burial 62	101-32	US-367455.
			Length				
33	1 5/8	4.12	4 7/8	12.38	Burial 31	149	US-367410.
			Width				
			2 3/8 3 5/16	6.03 8.41			
			Length				
34	1 7/8	4.76	4 7/8	12.38	Refuse A	32	US-367638.
			Width				
			3 3/4	9.52			
			Length				
35	1 11/32	3.42	6 13/16	17.35	Burial 92	187-32	US-367516.
			Width				
			2 11/16	6.83			
			Diameter				
36	4 1/16	10.31	6 3/16	15.71	Burial 30	146	US-367409.
37	3 1/4	8.25	7 3/16 7 7/16	18.25 18.89	Burial 105	247-32	US-367546.
38	2 11/16	6.82	6 3/16	15.71	Burial 122	125-32	US-367393.
39	3 1/16	7.77	6 1/16	15.39	Burial 15	92	US-367382.
40	2 11/16	6.82	6 21/32 6 25/32	16.88 17.22	Between SW. shelter and refuse mound structure 15.	38-32	US-367715.
41	3 9/16	9.04	8 3/8	21.27	Refuse A	33	US-367639.
42	3 1/16	7.77	8 1/4	20.95	Burial 11	29	US-367376.
43	3 9/16	9.07	8 1/4 8 5/16	20.95 21.11	Structure 15	65-32	US-367738.
44	3 13/16	9.68	9 15/16 10 1/4	25.25 26.02	Burial 59	93-32	US-367447.

APPENDIX B

SKELETAL REMAINS FROM THE WHITEWATER DISTRICT, EASTERN ARIZONA

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It is stated in Part 1 of this report (Bur. Amer. Ethnol. Bull. 121, p. 264) that skeletal remains of only 15 individuals, out of a total of 150 discovered, were sufficiently well preserved to recover. This is the number of specimens deposited in the United States National Museum. However, Dr. Roberts overlooked four other skeletons that were deposited in the Laboratory of Anthropology at Santa Fe. Since the Laboratory has kindly permitted me to study these, the total number of individuals upon which this report is based becomes 19, instead of 15. All are in a fairly good state of preservation.

The cultural periods from which this skeletal material comes are "Modified Basket Maker" (Basket Maker III) and "Developmental Pueblo" (Pueblo I and II). In the Whitewater District, where somewhat of a culture lag is indicated, the minimum and maximum dendrochronological dates between which these cultures flourished are 814 and 1014 A. D., respectively (Part I, p. 259). Although it is not always possible to assign conclusively a skeleton to one of the cultural periods, on account of the absence of grave goods, Dr. Roberts has arrived at the following classification for the present collection:

Pueblo I (possibly Basket Maker III)	Pueblo I	Pueblo II	Pueblo II (late)	Unknown
Cat. No.[1]	*Cat. No.*[2]	*Cat. No.*[1]	*Cat. No.*[1]	*Cat. No.*[1]
367845	(L) 50/1	367841	367839	367851
367848	(L) 50/2	367842	367840	367852
	(L) 50/3	367843	367846	
	(L) 50/4	367844		
		367847 (?)		
		367849		
		367850		
		368075		

[1] U. S. National Museum.
[2] Laboratory of Anthropology

Since the bulk of the material is assigned to "Developmental Pueblo," and also since the number of individuals is so small, there is little justification for analyzing separately the subgroups.

One fact relating to this collection has already appeared in print (Stewart, 1937); namely, that a majority of the skulls shows artificial "lambdoid" flattening. I have contended that this trait in itself indicates relationship with certain sites in Chaco Canyon and southwestern Colorado for which skeletal remains have been described. The archeological finds seem to bear this out. This type of deformation cannot be explained solely by the weight of the head upon a hard cradle board. The further significance of this point is that we are dealing here with a type of cranial deformity that is but slightly represented in most of the collections from the Pueblo area described heretofore. The reports of Matthews (1891), Hooton (1930), and Hrdlička (1931), involve several hundred specimens in which simple occipital deformity predominates. On the other hand, Retzius (1893) and von Bonin (1936) have described the only skulls with lambdoid deformity,[1] a total of 23 specimens.

I have called attention also (Stewart, 1936) to the fact that the dimensions of the skull are altered to different degrees by the two types of deformity, lambdoid and occipital. Thus, for example, length is less on the average in skulls with occipital deformity than in those with lambdoid deformity. At the same time it is improbable that any of the vault measurements, together with face breadth, altogether escapes modification in either type of deformity. For this reason, and also on account of the small number of one sex available, only brief comparisons will be made here.

METHODS

All measurements have been taken according to Hrdlička's technique (1939). Except as noted below, the figures on the present collection should be comparable with those of Hooton and most other American physical anthropologists. The exceptions chiefly concern skull length and orbital breadth. I follow Hrdlička's practice in both cases; namely, in measuring maximum skull length regardless of median plane, and in using lacrimale, instead of dacryon, for the medial landmark of orbital breadth. In the normal skull there is usually little difference between maximum skull length taken in the median plane and without regard to this plane. However, in deformed skulls, and especially when the deformation is asymmetrical, there may be considerable difference. Orbital breadth measured from lacrimale is usually a little smaller than that from dacryon, and hence gives a higher orbital index.

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[1] Hrdlička's catalogue (1931) contains some skulls with lambdoid flattening, but they are not distinguished from the others.

THE SKULL

Measurements of the individual skulls from the Whitewater District are given at the end (table 5). In addition, six skulls are illustrated in plates 52 to 57. Before making comparisons with other Pueblo groups it will be well to consider some of the views held at present regarding the Pueblo physical type.

As has already been pointed out, the presence of deformity, and especially of different types of deformity, in the Pueblo area makes comparison difficult. Attacks on this problem have centered largely upon determining the original or undeformed type of the skull. It is noteworthy that almost everyone who has studied Pueblo skulls has concluded that the original undeformed type was brachycranic. Few, however, have given a reason for this conclusion other than the implied fact that the deformed Pueblo skull is quite rounded.

Kidder, in 1924, having just established the fact that the long-headed, undeformed Basket Makers preceded the Pueblos in the Southwest, suggested (p. 122) that the Basket Makers had been replaced by the round-headed Pueblos. This view is still accepted generally (see Part I, p. 9). The basis for Kidder's assumption that the undeformed Pueblo skull would be round headed appears to be Hooton's Madisonville report (1920). Here the view is expressed that round heads are more easily affected than long heads by pressure of the occiput on a hard cradle board.[2] Obviously, when this reasoning is extended to the Pueblos two assumptions are involved: 1, that cranial deformation in this area is solely of the unintentional or cradle board variety; and 2, that long heads are relatively unaffected by this type of deformity. Neither of these assumptions has been proved.

Approaching the general problem from another angle, Shapiro (1928) devised some ingenious formulae to correct for the distortion and predict, so to speak, what the normal dimensions of the skull would be. The application of these formulae depend upon the possession of both deformed and undeformed skulls of the same people, which is rarely the case. The only Pueblo skulls to which these formulae have been applied are those from Pecos. In this case "all crania with very slight occipital deformation are regarded as undeformed, as it seems improbable that the cranial index has been much altered by the slight amount of deformity suffered." (Hooton 1930, p. 35.) Thus, having subjectively established the mean cranial index of the undeformed group at 78.3, in the case of males, the formulae restore nicely the deformed skulls to the same shape.

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[2] "Assuming artificial deformation to have been caused by pressure of the occiput on a hard cradle board, it seems clear that this cause would naturally affect round-headed infants to a greater extent than long-headed infants, for if the head of the child is free to turn from side to side, the tendency for the dolichocephalic child with the protruding occiput is to rest the head on one side or other rather than on the back. On the other hand, a brachycephalic child with an occiput more or less flat is likely to rest on the back of the head rather than on the side. Again, if the head is fixed so that it must rest on the occiput the greater convexity of the long-headed occiput presents less surface for deformation than the relatively flat occiput of the round head.

"On the whole the present writer is inclined to believe that radical changes in head form were not usually brought about by unintentional occipital deformation, but that the most of crania affected thereby were originally brachycephalic or sub-brachycephalic. Some few dolichocephalic crania may have been transformed into mesocephaly; more were probably transferred from the higher grades of mesocephaly to brachycephaly; still more brachycephalic crania were made increasingly so." (Hooton, 1920, p. 89.)

Hooton (1930) has analyzed the cranial indices of the Pecos material in another way:

> In total Series A 58.14 per cent of the male crania which are undeformed or only very slightly deformed, are either dolichocephals or mesocephals; 24 per cent of the undeformed female crania belong in this category. Of the deformed male skulls of Total Series A, 3.30 per cent are dolichocephals or mesocephals, and of the deformed female crania 13.23 per cent. According to our interpretation, then, the execess of dolichocephals in the undeformed series is caused by a relative immunity from occipital deformation which long-heads enjoy. (P. 35.)

Here again the asumption is that we are dealing with unintentional deformation. An alternate interpretation might be that the deformed group includes individuals whose heads, regardless of shape, were more securely bound to, or longer confined on, the cradle board.

In 1931 Hrdlička published measurements on the Pueblo crania in the United States National Museum, and on Basket Maker crania in the American Museum of Natural History, New York. Included among the Pueblos is a fair series of undeformed crania from Hawikuh ("Old Zuñi"). It is obvious from these figures that the Old Zuñis and Basket Makers are metrically very similar. This point has been emphasized further by Seltzer (1936):

> . . . the Hawikuh Zuñis, the Grand Gulch Southeastern Utah "Basket Makers," the Kidder and Guernsey Arizona "Basket Makers," the Salt River Salado crania, the Pueblo Bonito-Chaco Canyon skulls, Hough's Petrified Forest Arizona collection, Fewkes' Chaves Pass series, the Pecos "Basket Makers," and Hewett's Puye New Mexico series, should be recognized as being derived from a single racial stock or at the very least they should be considered as being representatives of very intimately related strains.
>
> This stock has been designated as the "Southwest Plateau" Indians.
>
> It is further suggested that there has been in the upland area of the Southwest a continuity of the "Southwest Plateau" stock from the Basket Maker period clear up to recent time. There is no evidence available yet to show that there was a sweeping change in physical type in the Southwest area in the transitional Basket Makers-Pueblo period.

Although Seltzer's figures in demonstration of his suggestion have not been published, they are essentially as given in table 1, except that different groupings are here used and statistical validation is lacking. It is evident from these figures that the dimensions least affected, if at all, by deformity are practically identical in both the deformed and undeformed groups. Included in this comparison are representatives from all of the recognized culture periods, Basket Maker to late Pueblo.

TABLE 1.—*Comparison of measurements (cm.) and indices least affected by deformation; deformed and undeformed series from the Southwest*

Locality	Capacity	Menton nasion	Alv. point nasion	Orb. height, mean	Orb. breadth, mean	Orbital index	Nasal height	Nasal breadth	Nasal index	Ext. alv. length	Ext. alv. breadth max.	Ext. alv. index
MALE												
Lambdoid def.:												
Whitewater	(7) 1341	(7) 11.7	(7) 7.1	(7) 3.4	(7) 3.8	(7) *89.6*	(7) 5.0	(7) 2.5	(7) *50.0*	(7) 5.3	(6) 6.6	(6) *124.1*
Chaco Canyon [1]	(9) 1359	(9) 12.3	(11) 7.2	(8) 3.5	(8) 3.8	(8) *91.4*	(11) 5.2	(11) 2.5	(11) *48.6*	(7) 5.2	(7) 6.7	------- [2] *128.8*
Southwest Colorado [3]	(6) 1380	(7) 12.1	(8) 7.1	(14) 3.4	(8) 3.9	(8) *86.3*	(14) 5.0	(8) 2.6	(8) *52.9*	------ ------	------ ------	------- -------
Occipital def.:												
Salt river [1]	(29) 1399	(12) 12.0	(41) 7.5	(50) 3.5	(48) 3.8	(48) *91.6*	(52) 5.2	(51) 2.5	(51) *48.4*	(38) 5.3	(32) 6.5	------- [2] *122.6*
Miscellaneous Arizona [1]	(24) 1380	(13) 12.2	(31) 7.4	(30) 3.5	(30) 3.8	(30) *90.9*	(33) 5.1	(33) 2.5	(33) *49.6*	(27) 5.4	(27) 6.5	------- [2] *120.4*
Pecos [4]	(68) 1368	(107) 11.9	(112) 7.3	(117) 3.5	------ ------	------ ------	(125) 5.1	(126) 2.6	(124) *50.4*	(100) 5.5	(97) 6.6	(97) *119.2*
Old Zuñi [1]	(10) 1331	(10) 12.0	(12) 7.2	(11) 3.5	(11) 3.8	(11) *92.1*	(12) 5.1	(12) 2.5	(12) *49.5*	(8) 5.4	(9) 6.5	------- [2] *120.4*
Undeformed:												
Old Zuñi [1]	(27) 1305	(29) 12.2	(32) 7.3	(30) 3.5	(30) 3.8	(30) *92.3*	(32) 5.1	(32) 2.5	(32) *49.3*	(27) 5.4	(27) 6.5	------- [2] *120.4*
Basket Maker [1]	(31) 1342	(21) 12.1	(33) 7.4	(40) 3.5	(39) 3.8	(39) *91.3*	(41) 5.1	(40) 2.5	(40) *49.2*	------ ------	(33) 6.6	------- -------
Basket Maker [4]	------- -------	(?) 11.6	(?) 7.3	(?) 3.4	------	------	(?) 5.1	(?) 2.5	(?) *50.1*	(?) 5.5	(?) 6.5	(?) *118.5*
FEMALE												
Lambdoid def.:												
Whitewater	(9) 1196	(9) 11.4	(10) 6.9	(11) 3.3	(11) 3.6	(11) *90.3*	(11) 4.8	(11) 2.4	(11) *50.3*	(10) 5.2	(9) 6.3	(9) *122.4*
Chaco Canyon [1]	(6) 1280	(2) 11.4	(6) 6.7	(6) 3.4	(6) 3.8	(6) *89.2*	(6) 4.9	(6) 2.5	(6) *50.7*	(4) 5.0	(3) 6.2	------- [2] *124.0*
Southwest Colorado [3]	------- -------	(4) 11.6	(6) 6.8	(9) 3.4	(4) 3.8	(4) *89.0*	(7) 4.9	(4) 2.4	(4) *49.6*	------ ------	------ ------	------- -------
Occipital def.:												
Salt river [1]	(42) 1231	(14) 11.4	(46) 6.9	(55) 3.4	(55) 3.7	(55) *91.9*	(54) 4.9	(54) 2.5	(53) *51.2*	(42) 5.2	(40) 6.1	------- [2] *117.3*
Miscellaneous Arizona.[1]	(31) 1253	(19) 11.5	(31) 7.0	(38) 3.4	(38) 3.7	(38) *91.2*	(37) 4.9	(37) 2.5	(37) *51.0*	(27) 5.4	(37) 6.3	------- [2] *116.7*
Pecos [4]	(54) 1254	(71) 11.3	(75) 6.9	(78) 3.4	------ ------	------ ------	(86) 4.8	(86) 2.5	(86) *52.6*	(66) 5.4	(66) 6.3	(65) *116.3*
Old Zuñi [1]	(14) 1199	(15) 11.0	(15) 6.7	(16) 3.4	(16) 3.7	(16) *89.9*	(15) 4.7	(15) 2.5	(15) *53.1*	(14) 5.1	(14) 6.2	------- [2] *121.6*
Undeformed:												
Old Zuñi [1]	(43) 1166	(38) 11.3	(42) 6.8	(44) 3.4	(44) 3.7	(44) *93.7*	(46) 4.8	(44) 2.5	(44) *52.7*	(39) 5.3	(38) 6.2	------- [2] *117.0*
Basket Maker [1]	(19) 1175	(13) 11.3	(22) 6.8	(22) 3.4	(23) 3.7	(22) *90.0*	(22) 4.8	(22) 2.5	(22) *51.4*	------ ------	(16) 6.3	------- -------

[1] Hrdlička, 1931.

[2] Calculated from the means.

[3] Retzius, 1893; von Bonin, 1936; and 8 specimens (3 male, 5 female) in the U. S. National Museum measured by the author.

[4] Hooton, 1930.

Still another point in favor of this interpretation has been brought out by von Bonin and Morant (1938). Speaking of Hooton's "undeformed" Pecos series they say:

> . . . . the Pecos Pueblo sample is peculiarly heterogeneous when compared with all the others considered, and hence it is not suitable for comparative purposes. Unusual variability is actually exhibited by its calvarial rather than by its facial measurements. (P. 110.)

This bears out the fact that deformed individuals are included among the undeformed and that the mean cranial index of 78.3 for males is too high.

A comparison of the ranges of the cranial index in the undeformed series is of interest:

Group	Male	Female
Pecos	(43) 68 -88	(25) 76 -96
Old Zuñi	(34) 68.3-84.3	(51) 70.6-90.3
Basket Maker	(33) 65.3-79.4	(20) 69.9-80.8

From this it seems not unlikely that some slightly deformed skulls are included among the Old Zuñis also. However, the lower limits of the ranges accord fairly well. In this connection it should be noted that von Bonin and Morant (1938) found a coefficient of racial likeness of 4.74 between Old Zuñi and Basket Maker. The total elimination of deformity would probably result in a still lower coefficient.

Returning to the measurements on the Whitewater series, some of which are summarized in table 1, we see that, with due allowance for small numbers, they show no marked divergence from the general "Southwest Plateau" type. The only notable difference is a somewhat broader palate among the groups with lambdoid deformity, which may correlate with the broader head.

Included in the Whitewater series are two undeformed skulls: U.S.N.M. No. 368075, a male, and U.S.N.M. No. 367848, a female (see pls. 57 and 56, respectively). The latter is distinguished from all the others in having a very low vault combined with mesocrany. This low vault recalls the skulls described by Woodbury (Haury, 1936) and attributed to the so-called Mogollon culture. However, comparisons of the vault measurements and indices of the undeformed Whitewater skulls with the ranges for the same in the Basket Makers and undeformed Old Zuñis (table 2) show that only one figure is unusual; namely, the mean height index of U. S. N. M. No. 367848. Moreover, it is probable that a larger series of Basket Makers would include an individual with such a relatively low vault. As for Woodbury's Mogollon skull, cranial deformity alone apparently prevents it from falling within the Basket Maker range. In this connection it may be noted that Nesbitt's (1938) two skulls, also classed as Mogollon, fit into the Basket Maker range, and at least one is high headed. Because neither Woodbury's nor Nesbitt's specimens are illustrated, visual comparison cannot be carried out.

TABLE 2.—*Ranges of vault measurements (cm.) and indices in undeformed series from the Southwest*

MALE

Group	Diam. ant.-post. max.	Diam. lat. max.	Basion-bregma height	Cranial index	Mean height index
Basket Maker [1]	17.0–19.0	12.4–14.0	12.8–14.4	*65.3–79.4*	*80.3–90.1*
Old Zuñi [1]	16.8–18.8	12.3–14.5	12.7–14.2	*68.3–84.3*	*80.6–91.2*
Whitewater (368075)	18.4	13.6	14.0	*73.9*	*87.5*

FEMALE

Group	Diam. ant.-post. max.	Diam. lat. max.	Basion-bregma height	Cranial index	Mean height index
Basket Maker [1]	16.4–17.7	12.3–13.7	12.0–13.2	*69.9–80.8*	*80.0–88.1*
Old Zuñi [1]	15.2–17.7	12.0–14.2	12.0–13.6	*70.6–90.3*	*80.8–92.4*
Whitewater (367848)	17.6	13.6	12.2	*77.3*	*78.2*
Mogollon (193) [2]	16.1	14.5	12.3	*90.1*	*80.4*

[1] Hrdlička, 1931.
[2] Haury, 1936, p. 134; slight occipital deformation.

THE SKELETON

Reliable measurements on long bones from the Pueblo area are available only for Pecos (Hooton, 1930) and the Lowry Ruin (von Bonin, 1936). Dr. Hrdlička kindly permitted me in 1935 to summarize his unpublished measurements of Basket Maker skeletons (Stewart 1935, tables 4 and 5), and now he has placed at my disposal his measurements of the Hawikuh femur. Individual measurements of the major long bones from the Whitewater District are given at the end (tables 6–8).

In table 3 the mean lengths of four major long bones from the Whitewater District are shown in comparison with those from Lowry, Pecos, Hawikuh and the Grand Gulch Region of Utah (Basket Maker). It is doubtful whether the technique of measurement, especially as concerns the tibia, is entirely comparable between these series. Moreover, the difficulty of sexing isolated long bones may possibly affect the means. In general, however, the Pueblos seem to be slightly smaller than the Basket Makers. Whether or not these differences are statistically significant, or due to the factors mentioned above, cannot be stated. The Whitewater series, although few in number, yields means slightly below those of Pecos. The Hawikuh and Pecos femora are about equal in length. Lowry long bones equal or exceed those of the Basket Makers, but here again the numbers are small.

In table 4 the shaft diameters of the left humerus, femur, and tibia are compared for the Whitewater, Pecos, and Basket Maker series. Similar data on the Hawikuh left femur are included. Here again differences in technique may affect the results, but probably not seri-

TABLE 3.—*Length (cm.) of four major long bones in Southwestern series*

MALE

Group	Right				Left			
	Max. length of humerus	Max. length of radius	Bicond. length of femur	Length of tibia in position	Max. length of humerus	Max. length of radius	Bicond. length of femur	Length of tibia in position
Whitewater	(5) 30.0	(4) 23.7	(3) 42.0	(3) 34.6	(4) 29.6	(2) 24.0	(4) 41.9	(2) 34.2
Pecos[1]	(125) 31.0	(91) 24.0	(145) 42.4	(130) 35.8	(134) 30.8	(100) 23.8	(142) 42.3	(117) 35.8
Hawikuh[2]	--------- ---------	--------- ---------	(49) 42.4	--------- ---------	--------- ---------	--------- ---------	(48) 42.7	--------- ---------
Basket Maker[3]	(39) 31.3	(37) 24.9	(33) 43.0	(32) 37.2	(32) 31.2	(30) 24.7	(33) 43.8	(29) 37.4

FEMALE

Group	Right				Left			
	Max. length of humerus	Max. length of radius	Bicond. length of femur	Length of tibia in position	Max. length of humerus	Max. length of radius	Bicond. length of femur	Length of tibia in position
Whitewater	(8) 28.2	(9) 21.9	(8) 39.1	(6) 32.3	(7) 28.0	(7) 21.5	(8) 39.4	(7) 32.5
Lowry[3]	(5) 28.7	(2) 22.1	(6) 40.3	--------- ---------	(4) 29.0	(1) 22.3	(5) 40.6	--------- ---------
Pecos[1]	(96) 28.9	(68) 21.9	(106) 39.2	(90) 32.7	(87) 28.5	(57) 21.7	(104) 39.3	(81) 32.4
Hawikuh[2]	--------- ---------	--------- ---------	(58) 38.9	--------- ---------	--------- ---------	--------- ---------	(59) 39.0	--------- ---------
Basket Maker[3]	(18) 28.8	(12) 22.2	(17) 40.0	(21) 34.1	(17) 29.3	(16) 22.6	(16) 40.1	(15) 34.2

[1] Hooton, 1930.
[2] Dr. Hrdlička's unpublished measurements.
[3] von Bonin, 1936.

TABLE 4.—*Shaft diameters (cm.) and indices of three major long bones in Southwestern series, left side*

MALE

Group	Humerus			Femur						Tibia		
	Diam. major at middle	Diam. minor at middle	Index of shaft	Diam. ant.-post. at middle	Diam. lateral at middle	Index of shaft	Diam. max. at upper flattening	Diam. min. at upper flattening	Platymeric index	Diam. ant.-post. at middle	Diam. lateral at middle	Index of shaft
Whitewater	(5) 1.9	(5) 1.4	(5) *72.2*	(5) 2.7	(5) 2.4	(5) *91.1*	(5) 3.0	(5) 2.1	(5) *70.6*	(4) 3.0	(4) 1.8	(4) *61.5*
Pecos[1]	(148) 2.1	(148) 1.6	(148) *75.4*	(156) 2.8	(156) 2.4	(156) *87.0*	(158) 3.2	(157) 2.3	(157) *73.8*	(146) 3.3	(146) 2.0	(146) *62.8*
Hawikuh[2]	------ ------	------ ------	------ ------	(51) 2.9	(51) 2.5	(51) [3] *86.9*	(51) 3.1	(51) 2.4	(51) *75.3*	------ ------	------ ------	------ ------
Basket Maker[2]	(34) 2.0	(34) 1.5	(34) *74.9*	(33) 3.0	(33) 2.5	(33) *81.0*	(34) 3.1	(34) 2.5	(34) *79.2*	(31) 3.3	(30) 2.1	(30 *65.*

FEMALE

Group	Humerus			Femur						Tibia		
	Diam. major at middle	Diam. minor at middle	Index of shaft	Diam. ant.-post. at middle	Diam. lateral at middle	Index of shaft	Diam. max. at upper flattening	Diam. min. at upper flattening	Platymeric index	Diam. ant.-post. at middle	Diam. lateral at middle	Index of shaft
Whitewater	(9) 1.9	(9) 1.3	(9) *72.2*	(8) 2.4	(8) 2.3	(8) *99.6*	(8) 2.9	(8) 2.0	(8) *66.7*	(8) 2.8	(8) 1.9	(8) *68.4*
Pecos[1]	(95) 2.1	(95) 1.5	(95) *68.2*	(119) 2.5	(118) 2.3	(118) *92.2*	(118) 2.9	(118) 2.2	(118) *73.4*	(107) 2.8	(107) 1.8	(107) *66.1*
Hawikuh[2]	------ ------	------ ------	------ ------	(60) 2.4	(60) 2.3	(60) [3] *94.0*	(60) 2.9	(60) 2.0	(60) *71.2*	------ ------	------ ------	------ ------
Basket Maker[2]	(23) 2.0	(23) 1.4	(23) *71.7*	(16) 2.6	(17) 2.4	(16) *91.2*	(17) 2.9	(17) 2.2	(17) *74.9*	(15) 2.9	(15) 2.0	(15) *68.3*

[1] Hooton, 1930.
[2] Dr. Hrdlička's unpublished measurements.
[3] Calculated from means.

ously. One point stands out sharply, namely, the unusual indices for the midshaft and upper end of the femur in the Whitewater series. These two indices represent opposite extremes in shape; the midshaft is quite rounded and the flattening of the upper end quite pronounced. A larger series will be needed before these differences can be accepted. In general it appears that the Pueblo and Basket Maker long bones are much the same in shape.

No major pathological changes appear to be present in the skeletons from the Whitewater District.

Attention is called to the large number of septal apertures of the humerus in the Whitewater series. Of the 10 male humeri 4 or 40 percent show apertures, and of the 17 female 10 or 58.8 percent show apertures. This contrasts with 12.2 percent in males and 27.9 percent in females at Pecos. In the Basket Makers the frequency of apertures is very little different than at Pecos (see Stewart, 1935, table 6).

SUMMARY

The skeletal remains from the Whitewater District are too few to furnish reliable means for basing metrical relationships. Nevertheless, further elaboration is given Seltzer's view that the evidence does not justify the theory of a sweeping change in physical type during the transitional Basket Maker-Pueblo period. It is pointed out that this theory rests chiefly upon the unproved premise that cranial defor-

TABLE 5.—*Measurements (cm.) and indices of individual skulls; Whitewater District*

Catalog No.	Age[1]	Deformation	Diam. ant.-post. max.	Diam. lat. max.	Basion-bregma height	Cranial index	Mean height index	Cranial module	Capacity (cc.) (Breitinger's method)
MALE									
367841[2]	M	Sl. occ.	16.3	14.5		89.0			1390
367845	M	Med. lambd.	17.2	13.9	13.5	80.8	86.5	14.9	1210
367850	M	Pron. lambd.	16.8	14.8		88.1			1370?
367851	M	Pron. lambd.	16.6	14.4	13.6	86.8	87.7	14.9	1315
367852	M	Sl. lambd.	17.0	14.1	13.6	82.9	87.2	14.9	1340?
368075	M	Undef.	18.4	13.6	14.0	73.9	87.5	15.3	1500
(L) 50/3[3]	O	Med. lambd.	16.2	14.3	13.5	88.3	88.8	14.7	1260
FEMALE									
367839[2]	Y	Med. lambd.	16.2	14.3	13.4	88.3	88.2	14.6	1170
367840	O	Med. lambd.	16.0	14.5	13.7	90.6	90.1	14.7	1150
367842	Y	Pron. lambd.	16.0	15.0	14.4	93.8	92.9	15.1	1345
367843	O	Pron. lambd.	15.6	14.0	13.3	89.7	89.9	14.3	1090
367846	O	Med. lambd.	16.3	14.2	13.4	87.1	88.2	14.6	1190
367847	M	Pron. lambd.	15.7	14.5	12.8	92.4	84.8	14.3	1145
367818	M	Undef.	17.6	13.6	12.2	77.3	78.2	14.5	1265
367849	M	Med. lambd.	16.9	14.1		83.4			1250?
(L) 50/1[3]	M	Pron. occ.		15.8?					
(L) 50/2	Y	Med. lambd.	16.1	14.4		89.4			
(L) 50/4	Y	Med. lambd.	16.4	14.0	13.1	85.4	86.2	14.5	1160

[1] Y=young adult; M=middle age; O=old.

[2] U. S. National Museum.

[3] Laboratory of Anthropology.

TABLE 5.—*Measurements (cm.) and indices of individual skulls; Whitewater District*—Continued

MALE

Catalog No.	Men-ton-nasion height	Alv. point nasion height	Diam. biz. max.	Facial index, total	Facial index, upper	Basion-nasion	Basion-sub-nasal point[4]	Basion-alv. point	Facial angle	Alve-olar angle
367841	11.6	7.0	14.4	*80.6*	*48.6*	--------	--------	--------	--------	--------
367845	11.4	6.9	--------	--------	--------	10.1	8.7	9.8	72°	54°
367850	12.3	7.3	(12.6)	*(97.6)*	*(57.9)*	--------	--------	--------	--------	--------
367851	12.0	7.2?	13.8	*87.0*	*52.2*	10.0	8.5	9.7?	70	51
367852	11.6	7.1	14.0	*82.9*	*50.7*	10.0	8.8	9.9	70	54
368075	11.6	7.1	13.8?	*84.1*	*51.4*	10.4	8.5	9.5	76	56
(L)50/3	11.5	7.1	13.1	*87.8*	*54.2*	9.8	8.4	9.8	69	50

FEMALE

Catalog No.	Men-ton-nasion height	Alv. point nasion height	Diam. biz. max.	Facial index, total	Facial index, upper	Basion-nasion	Basion-sub-nasal point[4]	Basion-alv. point	Facial angle	Alve-olar angle
367839	11.1	6.7?	13.3	*83.5*	*50.4*	9.7	8.2	9.2	73	52
367840	(11.4)	7.0	12.9	*(88.4)*	*54.3*	9.3	8.2	9.4	68	54
367842	10.9	6.3	12.6	*86.5*	*50.0*	9.8	8.3	9.4	74	52
367843	--------	--------	12.7	--------	--------	9.3	7.6	--------	--------	--------
367846	11.1	6.7	(12.2)	*(91.0)*	*(54.9)*	9.1	7.7	9.0	69	50
367847	11.7	7.0	12.1	*96.7*	*57.8*	9.2	7.6	8.8	70	53
367848	11.3	6.9	13.0	*86.9*	*53.1*	9.6	8.4	9.5	70	47
367849	11.5	7.0	(12.9)	*(89.2)*	*(54.3)*	--------	--------	--------	--------	--------
(L)50/1	12.4?	7.3	13.6?	*91.2*	*53.7*	--------	--------	--------	--------	--------
(L)50/2	11.5	7.0	12.9	*89.2*	*54.3*	--------	--------	--------	--------	--------
(L)50/4	11.4	6.7	12.7	*89.8*	*52.8*	9.3	8.2	9.4	68	49

MALE

Catalog No.	Orbits: height, right, left	Orbits: breadth, right, left	Orbital index, mean	Nose height	Nose breadth, max.	Nasal index	External alveolar length	Ext. alv. br. max.	Ext. alv. index	Diam. front. min.
367841	3.50 3.55	4.15 4.15	*84.8*	5.2	2.7	*51.9*	5.3?	6.9	*130.2*	9.7
367845	-------- 3.20	-------- 3.80	*84.2*	4.9	2.4	*49.0*	5.5	6.4	*116.4*	9.4
367850	(3.40) 3.50	(3.60) 3.70	*94.6*	5.2	2.5?	*48.1*	5.1?	6.5?	*127.4*	9.4
367851	3.45 3.55	3.80 3.80	*92.1*	5.1	2.5	*49.0*	5.3?	--------	--------	9.5
367852	3.55 3.65	3.80 3.80	*94.7*	5.0	2.6	*52.0*	5.3	6.8	*128.3*	9.2?
368075	3.55 3.50	3.80 3.90	*91.4*	5.1	2.5	*49.0*	5.1	6.6	*129.4*	9.3
(L)50/3	3.00 3.00	3.50 3.50	*85.7*	4.7	2.4	*51.1*	5.4	6.1	*113.0*	9.1

FEMALE

Catalog No.	Orbits: height, right, left	Orbits: breadth, right, left	Orbital index, mean	Nose height	Nose breadth, max.	Nasal index	External alveolar length	Ext. alv. br. max.	Ext. alv. index	Diam. front. min.
367839	3.35 3.40	3.80 3.80	*88.9*	5.0	2.5	*50.0*	5.0	6.6	*132.0*	9.0
367840	3.20 3.10	3.60 3.60	*87.5*	4.6	2.2	*47.8*	5.3	--------	--------	9.1
367842	3.20 3.10	3.40 3.40	*92.6*	4.4	2.5	*56.8*	5.3	6.6	*124.5*	8.8
367843	3.45 3.45	3.70 3.60	*94.5*	4.6	2.2	*47.8*	--------	--------	--------	8.7
367846	3.25 3.20	3.45 3.45	*93.3*	4.6	2.4	*52.2*	5.0	6.1	*122.0*	8.6
367847	3.05 2.90	3.40 3.40	*87.6*	4.7	2.3	*48.9*	4.8	5.8	*120.8*	8.8
367848	3.65 --------	3.90 --------	*93.6*	5.3	2.4?	*45.3*	5.1	6.3	*123.5*	8.6
367849	3.15 3.25	3.70 3.60	*87.7*	4.7	2.3	*48.9*	5.6	6.0	*107.1*	8.6
(L)50/1	3.20 3.20	3.85 3.90	*82.5*	4.9	2.5?	*51.0*	5.4	6.9?	*127.8*	9.3
(L)50/2	3.30 3.20	3.60 3.60	*88.9*	4.8	2.6	*54.2*	5.2?	6.6	*126.9*	9.3
(L)50/4	3.40 3.50	3.60 3.55	*96.4*	4.8	2.4	*50.0*	5.2	6.1	*117.3*	9.2

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[4] See Hrdlička, 1939, p. 124, for definition of subnasal point.

mation among the Pueblos was entirely accidental, in the sense that it was due solely to the weight of the head upon a hard cradle board. The predominance of lambdoid deformation (unexplainable on the basis simply of head weight) in the Whitewater District, and among the culturally related groups in New Mexico and Colorado, lends force to the view that in general among the Pueblos deformation was more than accidental, thus effectively masking the long-headed form of the natural skull. It is hoped that the more essential measurements of the individual skulls and long bones recorded here will aid in the future extension of these investigations.

TABLE 6.—*Measurements (cm.) and indices of individual bones of the upper extremity; Whitewater District*

RIGHT, MALE

Catalog No.	Humerus					Max. length radius	Max. length ulna	Max. length clavicle
	Max. length	Diam. maj. at middle	Diam. min. at middle	Index of shaft	Septal aperture			
367841 [1]	31.7	2.0	1.5	*75.0*	Absent	25.3	26.6	
367844	30.8	2.0	1.5	*75.0*	Absent	24.8	26.2	15.0
367845	28.2	2.1	1.4	*66.7*	Absent	22.2		(14.8)
368075	30.4	2.1	1.4	*66.7*	Absent	22.5	24.3	15.3
(L)50/3 [2]	29.0	1.8	1.3	*72.2*	Medium			
RIGHT, FEMALE								
367839	29.8	1.8	1.3	*72.2*	Large	22.6	24.7	13.3
367840	27.8	2.0	1.4	*70.0*	Absent	21.1	22.7	
367842	26.9?	1.8	1.4	*77.8*	Absent	21.5	23.0	13.6
367843	28.5	1.9	1.2	*63.2*	Small	21.2	22.6	12.3
367846	26.0	1.8	1.2	*66.7*	Small	20.2		12.0
367847	27.4	1.9	1.2	*63.2*	Medium			
367848	30.0	1.9	1.4	*73.7*	Small	21.7		
(L)50/1					?	22.9		
(L)50/2					Absent	24.4		
(L)50/4	28.8	2.1	1.5	*71.4*	Absent	21.9	23.7	13.3
LEFT, MALE								
367841	31.5	2.0	1.5	*75.0*	Absent			
367844		2.0?	1.4?	*70,0*	Absent	25.0		14.9
367845	27.9	2.0	1.4	*70.0*	Small		23.8	
368075	30.3	1.9	1.4	*73.7*	Small	22.3	24.1	
(L)50/3	28.9	1.8	1.3	*72.2*	Large			
LEFT, FEMALE								
367839	29.0	1.8	1.3	*72.2*	Large	21.8	24.1	13.9
367840	27.4	2.0	1.3	*65.0*	Small	20.8	23.1	
367842		1.8?	1.4?	*77.8*	Absent	21.3	23.4	13.7
367843	28.0	1.8	1.3	*72.2*	Absent	21.0	22.9	12.6
367846	25.9	1.7	1.3	*76.5*	Small	20.0	21.9	12.2
367847	27.4	1.9	1.3	*68.4*	Medium			
367848		1.9?	1.4?	*73.7*	?		23.4	13.4
(L)50/2	30.1	1.9	1.4	*73.7*	Medium	23.8	24.9	
(L)50/4	28.5	2.0	1.4	*70.0*	Absent	21.6	23.3	13.2

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[1] U. S. National Museum.
[2] Laboratory of Anthropology.

TABLE 7.—*Measurements (cm.) and indices of individual femora; Whitewater District*

RIGHT, MALE

Catalog No.	Length maximum	Length bicondylar	Diam. ant.-post. at middle	Diam. lat. at middle	Index of shaft	Diam. max. upper flat.	Diam. min. upper flat.	Platymeric index
367841 [1]	42.9	42.5	2.6	2.4	*92.3*	3.2	2.2	*68.8*
367844	----------	----------	3.2	2.3	*71.9*	3.0	2.4	*80.0*
367845	----------	----------	2.5?	2.6?	*104.0*	3.0	2.0	*66.7*
368075	42.2	41.9	2.6	2.5	*96.2*	3.2	2.2	*68.8*
(L) 50/3 [2]	41.8	41.6	2.3	2.0	*87.0*	2.7	1.7	*63.0*
RIGHT, FEMALE								
367839	41.5	40.3	2.4	2.4	*100.0*	3.0	2.0	*66.7*
367840	----------	38.2?	2.7	2.2	*81.5*	2.8	2.0	*71.4*
367842	37.8?	37.5?	2.0	2.0	*100.0*	2.7	1.7	*63.0*
367843	40.2	40.2	2.5	2.5	*100.0*	3.1	2.0	*64.5*
367846	37.4	36.9	2.4	2.3	*95.8*	3.0	1.9	*63.3*
367848	41.2?	40.8?	2.4	2.7	*112.5*	3.1	2.1	*67.7*
(L) 50/2	----------	41.2?	2.5	2.5	*100.0*	2.9	2.2	*75.9*
(L) 50/4	38.4	38.0	2.2	2.2	*100.0*	2.7	1.9	*70.4*
LEFT, MALE								
367841	43.0	42.7	2.6	2.6	*100.0*	3.1	2.2	*71.0*
367844	43.6	43.4	3.2	2.4	*75.0*	3.0	2.3	*76.7*
367845	----------	----------	2.5	2.4	*96.0*	3.0	2.0	*66.7*
368075	42.4	41.9	2.7	2.4	*88.9*	3.1	2.2	*71.0*
(L) 50/3	39.9	39.5	2.3	2.2	*95.6*	2.8	1.9	*67.8*
LEFT, FEMALE								
367839	42.0	40.9	2.4	2.4	*100.0*	2.9	2.0	*69.0*
367840	38.9	38.5	2.6	2.2	*84.6*	2.9	2.0	*69.0*
367842	38.2?	37.8?	1.9	2.0	*105.3*	2.8	1.7	*60.7*
367843	40.4	40.3	2.6	2.3	*88.5*	3.0	2.0	*66.7*
367846	37.7	37.1?	2.2	2.2	*100.0*	2.9	1.7	*58.6*
367848	40.9	40.6	2.3	2.7	*117.4*	3.2	2.1	*65.6*
(L) 50/2	42.0	41.5	2.6	2.5	*96.2*	2.9	2.1	*72.4*
(L) 50/4	----------	38.1?	2.2	2.3	*104.5*	2.8	2.0	*71.4*

[1] U. S. National Museum.

[2] Laboratory of Anthropology.

TABLE 8.—*Measurements (cm.) and indices of individual tibiae and fibulae; Whitewater District*

RIGHT, MALE

Catalog No.	Tibia				Max. length fibula
	Length in position	Diam. ant.-post at middle	Diam. lat. at middle	Index of shaft	
367841 [1]	----------	2.9?	2.1?	*72.4*	37.1
367844	35.3	3.3	1.9	*57.6*	35.0
368075	33.9	3.2	1.8	*56.2*	33.5
(L) 50/3 [2]	34.7	2.4	1.7	*70.8*	33.3?
RIGHT, FEMALE					
367839	34.0	2.8	2.0	*71.4*	33.0
367840	31.0	2.7	1.8	*66.7*	30.8
367842	----------	2.5?	1.9?	*76.0*	----------
367843	32.2	3.0	1.8	*60.0*	31.3
367846	30.4?	2.6	1.7	*65.4*	----------
367848	33.6	3.2	2.1	*65.6*	32.7
(L) 50/2	----------	----------	----------	----------	34.0
(L) 50/4	32.8	2.5	1.8	*72.0*	32.6
LEFT, MALE					
367841	----------	2.9?	1.9?	*65.5*	----------
367844	----------	3.2?	1.9?	*59.4*	35.5
368075	34.0	3.1	1.8	*58.1*	34.1
(L) 50/3	34.5	2.7	1.7	*63.0*	33.3
LEFT, FEMALE					
367839	34.0	2.8	2.2	*78.6*	33.2
367840	30.9	2.8	1.8	*64.3*	30.6
367842	----------	2.7?	2.3?	*85.2*	----------
367843	32.1	2.9	1.8	*62.1*	31.3
367846	30.4	2.7	1.6	*59.3*	30.5
367848	33.6	3.2	2.1	*65.6*	32.8
(L) 50/2	34.2	2.8	1.8	*64.3*	34.1
(L) 50/4	32.5?	2.5	1.7	*68.0*	32.3

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[1] U. S. National Museum.
[2] Laboratory of Anthropology.

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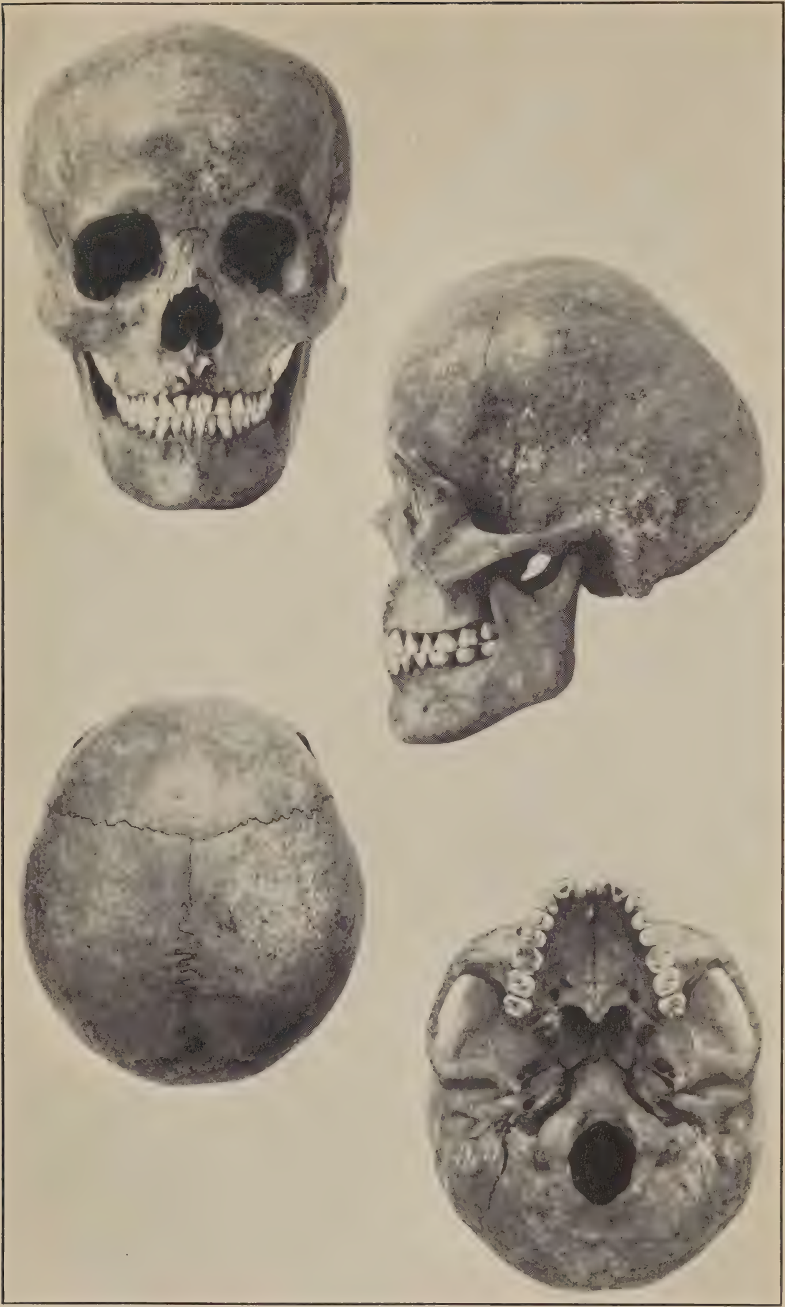
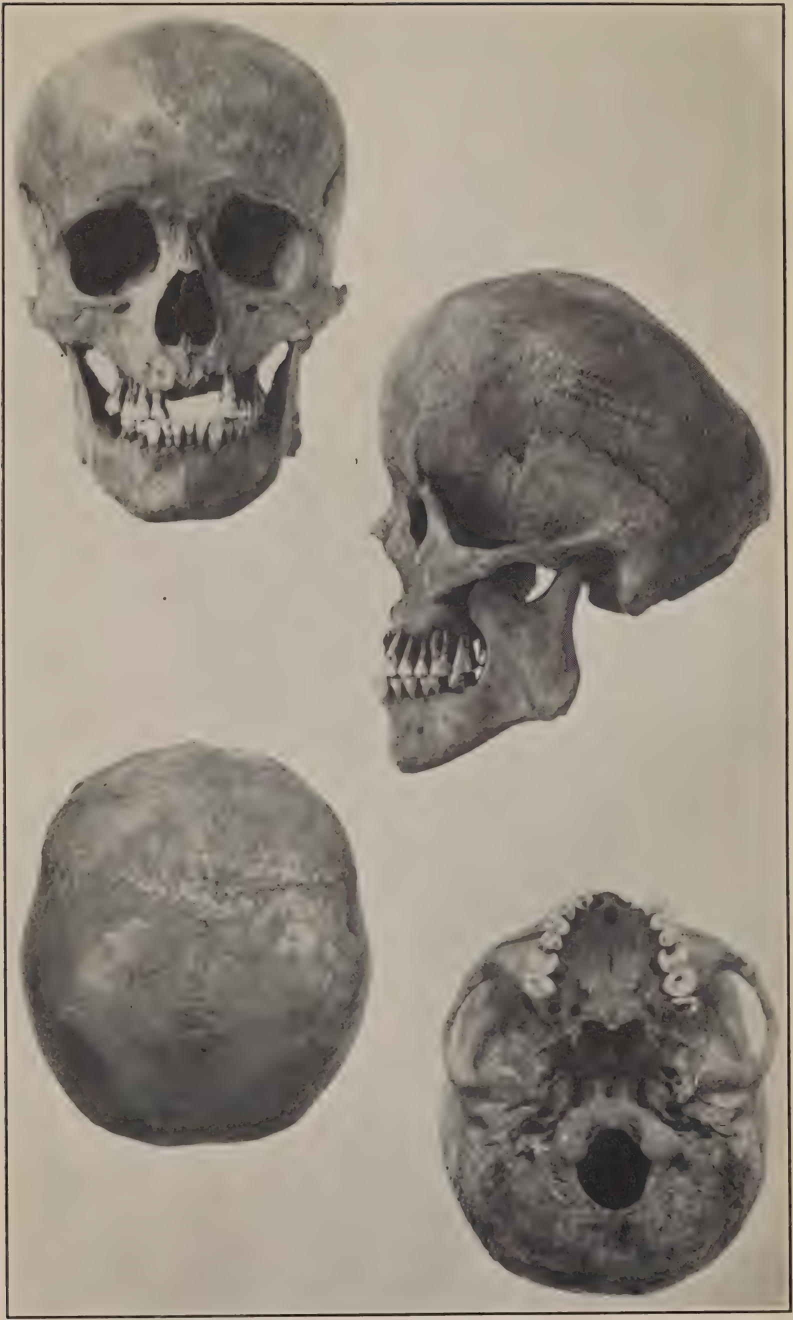
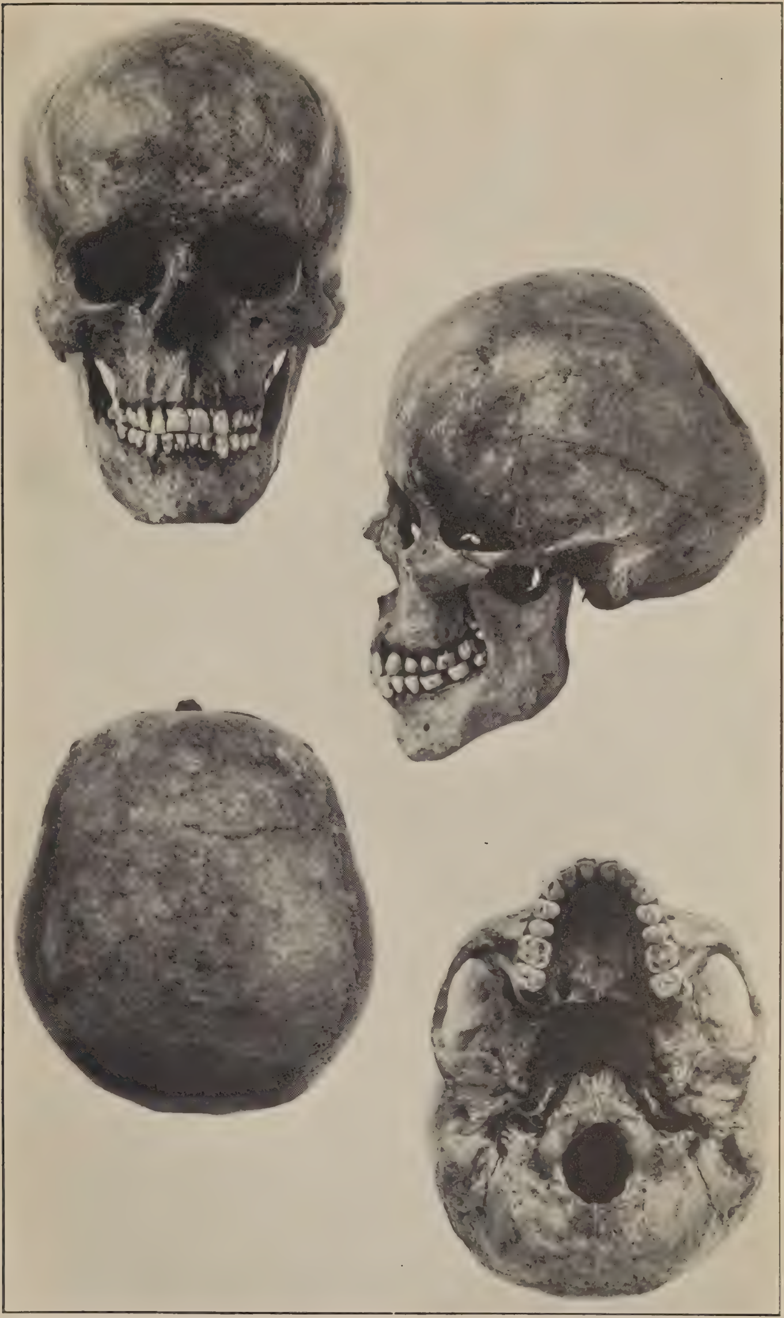


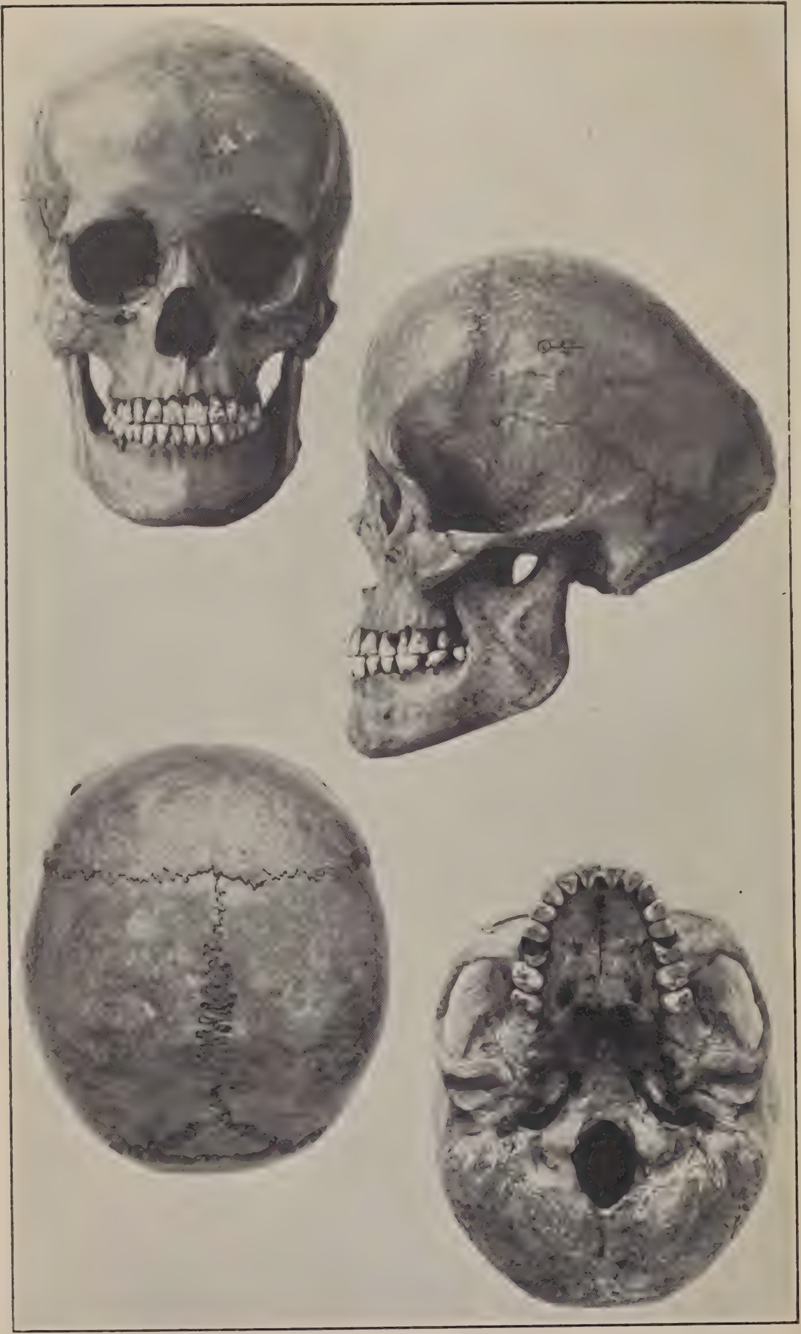
Four Views of Deformed Female Skull U. S. N. M. No. 367839, Oriented in Eye-Ear Plane. Note Dental Anomaly.



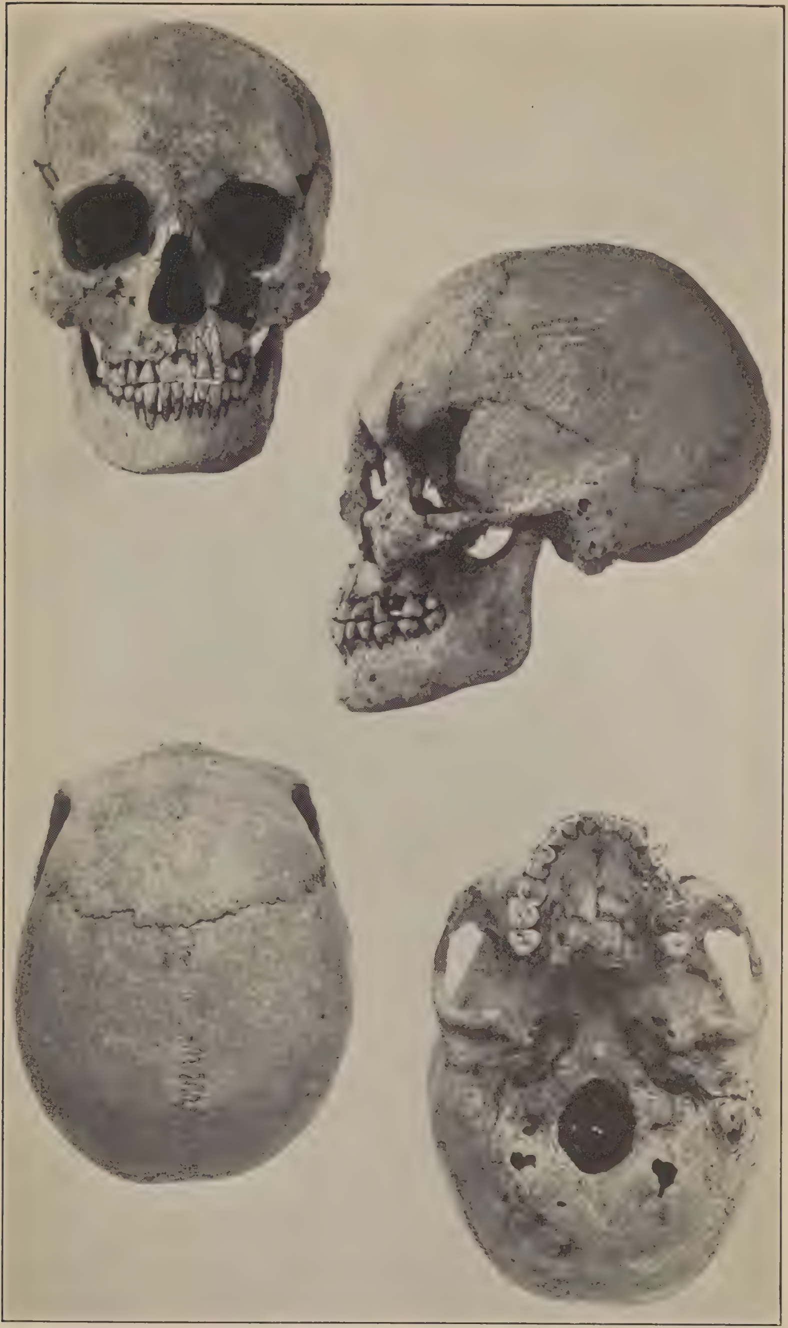
FOUR VIEWS OF DEFORMED MALE SKULL U. S. N. M. NO. 367851, ORIENTED IN EYE-EAR PLANE.



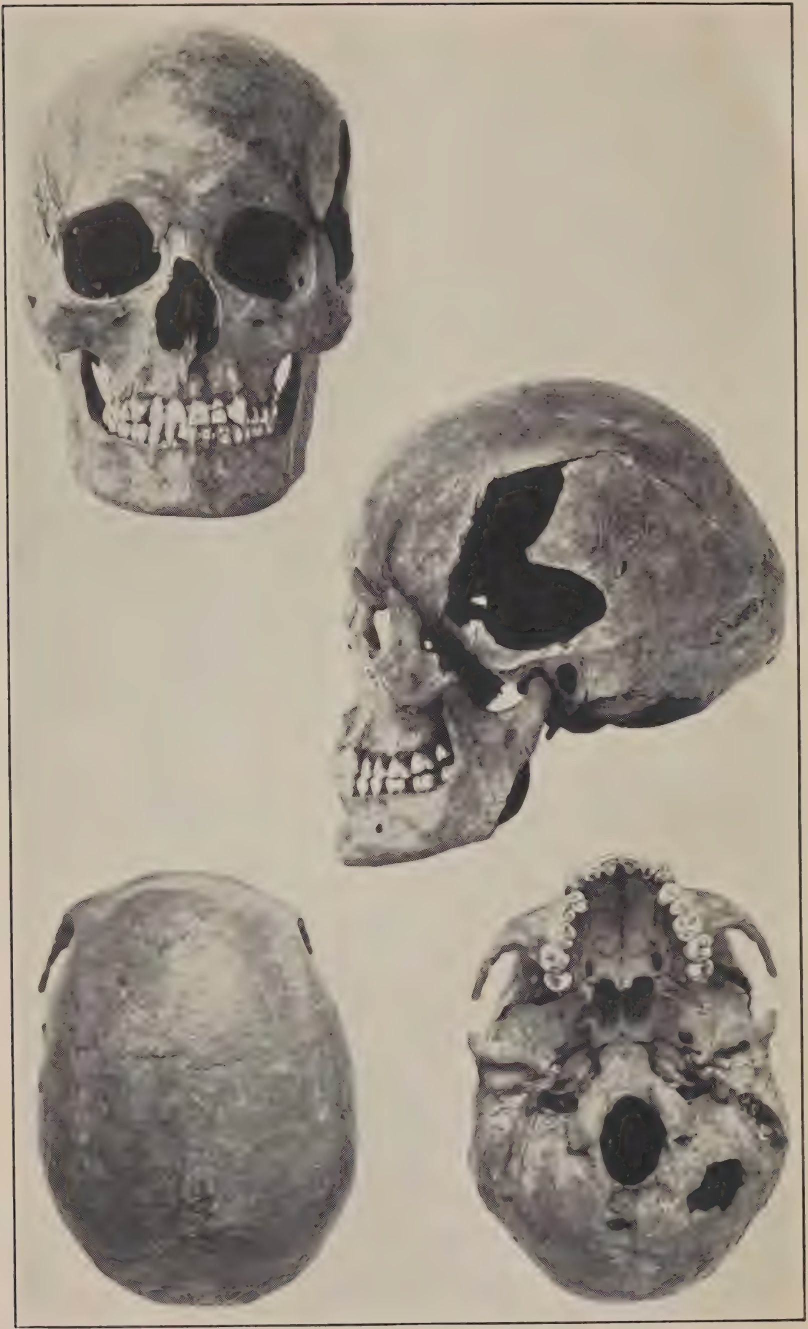
Four Views of Deformed Male Skull L. A. No. 50–3, Oriented in Eye-Ear Plane. Note Fracture on Back Part of Skull.



FOUR VIEWS OF DEFORMED FEMALE SKULL L. A. NO. 50-4, ORIENTED IN EYE-EAR PLANE.



Four Views of Undeformed Female Skull U. S. N. M. No. 367848, Oriented in Eye-Ear Plane. Note Low Vault.



FOUR VIEWS OF UNDEFORMED MALE SKULL U. S. N. M. NO. 368075, ORIENTED IN EYE-EAR PLANE. NOTE HIGH VAULT.

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